Special Supplement

TO

THE LANCET

ON

MEDICAL EDUCATION IN THE UNITED STATES AND CANADA

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MEDICAL EDUCATION IN THE UNITED STATES AND CANADA.

MEDICINE, a science and an art, has no territorial boundaries. However varying in details and in general sequelæ, and however those sequelæ may be influenced according to environment, climate, and circumstances, disease will have general manifestations; there is always something common about pathology making of disease a great international concern and a link between all the peoples of the world. It follows that as far as disease, its manifestations and its expressions, are common, there should be some common form recognised by modern knowledge to be the best by which to train up those who have to combat disease—some form which, while it is applicable, so far as it goes, to the needs of to-day, should be a preparation for the developments of the future.

An English-speaking Union.

The education of medical students on some international pattern would mean a reciprocity in medicine which none of us will live to see, and for which civilisation is not prepared; but, nevertheless, such an event is nearer than would have been thought possible when intercommunication between nations was more limited, and while our conceptions of pathology were less broad. Already the knowledge that British medical men are trained from the start in a form which is comparable to that which prevails in the United States and Canada shows that a practical reciprocity between the medicine of the English-speaking peoples exists, and may be making ready the path for a larger fusion. Hence the pattern of the medical education prevailing on the other side of the Atlantic is important to us all, both for what it is and what it may later imply. Further, fullness of understanding between the English-speaking peoples in all departments of life must make for the happiness of a world that is so permeated with their energies. The informal report which follows is the outcome of a sojourn in the United States and Canada, having these views as its inspiration. An endeavour is made to set out in a succinct shape the educational curricula, as pursued in a representative group of American and Canadian medical centres, in order to see how far the admitted similarity between them and our British curricula is fundamental and what the divergencies may be. The medical centres selected for personal visit number fourteen—twelve in the United States, and two in Canada—and, while it is an undoubted defect in the undertaking that the personal inspection had to be thus limited, the representative character of the Universities, whose medical Faculties are thus brought under notice, will not be disputed.

Centres Visited.

In the United States the representative of THE LANCET visited the Universities of Harvard, Cornell, Columbia, New York, Yale, and Pennsylvania, the Jefferson College, Johns Hopkins and North-Western Universities, and the Universities of Chicago, Illinois, and Ann Arbor; in Canada, McGill University, Montreal, and the University of Toronto were visited. At each University he received the most ample assistance and the readiest help, and our gratitude is extended to all those connected with the different centres of medical education—a very large number—who made it possible for this report to be written.

Medical men in the United States, Canada, and Great Britain are familiar through an English-written medical press, and through many opportunities of personal intercourse, with the leading developments of medical theory and technique in each country; thus they can institute comparisons, giving support to and taking from each other's performances; so what may be called the end-products of our systems of education are known to us. But those systems themselves come under no similar process of inspection, and no such common familiarity with their details exists. Yet, every whit as much as in our pathology, it is of high importance that we should each know what the other is doing; and in the field of undergraduate medical education we can learn much from a pooling of mutual experiences. Just as the manifestations of disease are common so the great objectives of early medical training are common, whatever particular country is in question—if, of course, its standard of civilisation is sufficiently high. All know it to be desirable to educate those who join the ranks of medicine so that the new men shall be able to carry on their work in two main directions—directions which are but two sides of the same road. Those who would join our ranks must be turned out from their medical schools fit to conduct the service of healing for the public good, and they must also have such a conception of the science and art of medicine that they will be able to appreciate and assimilate the meaning of new developments, and, if opportunity arises, to assist in these developments by personal contributions.

Variations in the Curriculum.

These notes on undergraduate medical education form a matter of fact attempt to place before the readers of THE LANCET a précis of medical education as it is conducted at the selected centres, the shape in which the information is supplied being that of the usual educational supplements of THE LANCET dealing with the British medical schools. The history of a school is often pertinent to its development, and a few words are generally included upon the subject; the various curricula are set out in some detail, and the material facilities offered to the students are described, in some cases more fully than in others, while notes are added upon the institutions, small and great—often palatial—at which the clinical instruction is given. How much the whole educational course is the same at each of these centres is revealed by repetitions, and the similarity of these courses to our own statutory pattern, as regulated by the General Medical Council, emerges and reveals the gratifying fact that, in seeking models, neither the United States nor Canada has had any hesitation in looking to Great Britain. At the same time profound differences of ideal and action are evident. The notes upon the fourteen centres are followed by reflections upon these differences, for the comprehension of where the systems of education vary will suggest the places where progress may be made by selection.

MEDICAL EDUCATION IN THE UNITED STATES.

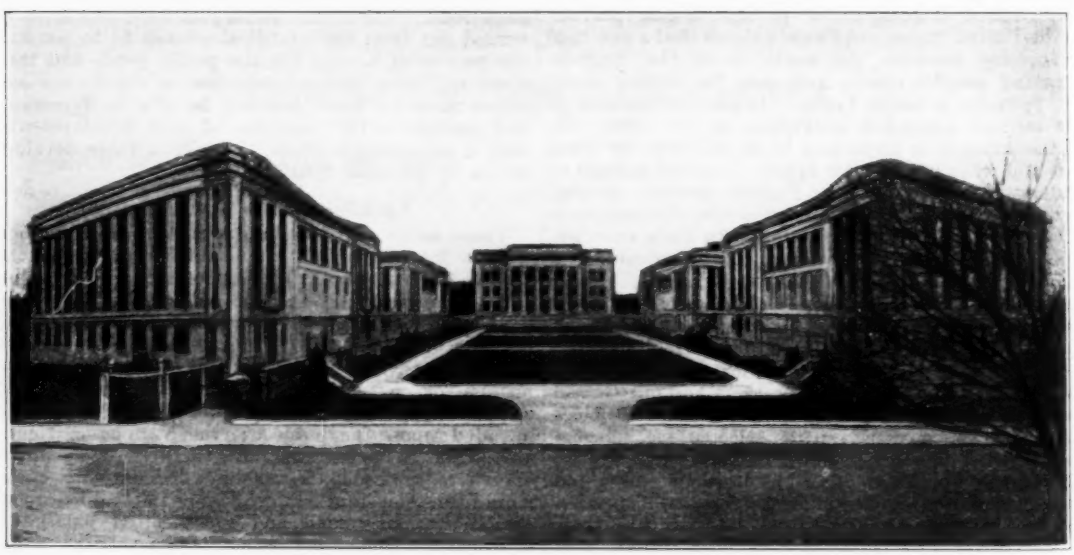
I.—THE MEDICAL SCHOOL OF HARVARD UNIVERSITY.

Historical.

THE course in medicine, established by Harvard University in 1782, was given in buildings of the College, University Hall, and Holden Chapel from the date of establishment until 1810, when the classes were transferred to Boston. In 1816 the first medical school building was erected, while until as late as 1906 the school was situated in the buildings now used by Boston University in the centre of the city; but in 1906 the University completed a notable group of white marble buildings on Longwood Avenue for the occupation of the school. The appearance of the school, owing not only to its structure but to the material employed, can only be described as magnificent (Fig. 1); the use, however, of white marble, not in the original design, was due to the contractors having so much marble at their disposal that they offered to keep their bargain in this way. These buildings, five in number, stand in 11 acres of surrounding ground in the outskirts of Boston, one being designed for the administration and four for the housing of laboratories and departments for clinical instruction. On the road frontage there has now been placed a beautiful war memorial screen.

The administration building contains the Faculty and dean's offices, the central library, and the Warren Anatomical Museum, a very famous collection of over 30,000 specimens, illustrating normal and pathological anatomy. The museum was founded in 1847 by the great Prof. John Collins Warren.

FIG. 1.—THE HARVARD MEDICAL SCHOOL.



THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

The Faculty of Medicine at Harvard provides for a four years' curriculum as a minimum for the acquirement of the sciences directly ancillary to medicine in the school and for their clinical application in the wards of an accredited hospital; but a pre-medical course is assumed, during which a four years' course in a high school or its equivalent must have been completed, in addition to at least two years' work in college, including general inorganic and organic chemistry, physics, and biology. Almost all entrants come in with an Arts degree after four years in a university.

The terminology employed in American universities in setting out their curricula requires a little explanation for British readers. The usual procedures that take place in the American centres are not represented exactly in Great Britain, but just as the objects to be attained are the same so the methods adopted are parallel, though differently named. For example, a high school gives the kind of training that is given in Great Britain at the *public* school, and it is, of course, puzzling to the American to find that the British *public* school is not a State or, as we should say, Board school, but a strictly private establishment. Again, satisfactory evidence of study is provided in America not by simple testamur, but by the production of exact evidence of the time spent in study, as well as details of that instruction. Thus the student desiring admission to the medical school of an American university has to secure "time credits" from his previous school or seminary as proof of his fitness, and this is done by the production of certificates indicating the number of "semester hours" spent to the satisfaction of teachers in acquiring a grounding in selected subjects. A semester hour is one hour of lecture or recitation or two hours of laboratory work per week; as the half year's study is assumed to consist of 16 weeks the duration of the student's actual study can be exactly calculated. To meet the science requirements satisfactorily for admission to any medical school the amount of time credit in an establishment of adequate standing has to be obtained.

At Harvard flexibility in organisation is shown by

the fact that students from other approved medical schools may be admitted to a standing comparable to that they would have held at their original seat of instruction, all matriculation tests having been passed and satisfactory testimonials and time credits produced. Later in the curriculum this process works the other way, for students are allowed, on giving

Second Year.—In this year the time allotted to pathology and neuropathology is large, while more than a commencement of instruction in general medicine and surgery takes place. Anatomy is continued, especially as a study of frozen sections, thus providing a topographical review of the first year's work; bacteriology and physical pathology

FIG. 2.—THE MASSACHUSETTS GENERAL HOSPITAL.

In the Bulfinch building of the Massachusetts General Hospital, in the central dome, the first operation under general anæsthesia produced by the vapour of ether was performed by Dr. W. T. G. Morton on Sept. 30th, 1846.

adequate reasons, to do parts of their work elsewhere than at Harvard, and in this way a Harvard student may acquire something of an international training. Analogous procedures occur at some other educational institutions in the United States.

The candidates for admission to the school largely outnumber those who can possibly be selected, as we shall see to be the case at most of the American universities. Selection is made on general grounds as well as by careful scrutiny of individual claims, but always time credits and proofs of capacity must be produced from proper sources in respect of inorganic and organic chemistry, physics, and biology, with a due knowledge of English, and a reading acquaintance with French or German. The average number of applicants at Harvard during the past five years has been about 400, while the freshman's class has been limited to 125.

SUMMARY OF STUDIES.

The medical course proper extends over four years, while the division of studies is not quite usual, though the logical nature of the scheme is apparent. The length of curriculum is the same as that enjoined by the General Medical Council in Great Britain, as the work of the first year in British schools has to be done in the compulsory pre-medical years at Harvard.

First Year.—The time of the student is divided almost equally between anatomy, histology with embryology, physiology, and biochemistry, but a short course in psychology of distinctly medical bearing is introduced. Half of the time is passed in the dissecting room and half in the histological and embryological laboratories. He must dissect the main divisions of the body to the satisfaction of the demonstrators.

are introduced as well as short courses in obstetrics and pediatrics. The instruction in bacteriology is directed particularly to the consideration of immunity and the problems of infectious disease, the teaching being illustrated by material obtained from the institutions where the later clinical training will be conducted mainly—namely, the Peter Bent Brigham, Massachusetts General, and the Children's hospitals. An early association is thus established between the diagnosis and treatment of disease and is developed by the pathological course. This consists of laboratory work, in connexion with which there are demonstrations of fresh material and museum specimens, and research experiments; while during the entire period groups of students are supervised at various hospitals—those already named, the Boston City Hospital and its adjacent block for contagious diseases, and the Boston Lying-in Hospital.

Third Year.—The student now is mainly occupied with general medicine and surgery; obstetrics and gynæcology are pursued, and there is time allotted for the study of all the usual specialties, the wards both of the great general hospitals and of certain special institutions being available for the purpose. He must take charge of and report on 12 cases in obstetrics under supervision.

Fourth Year.—About 33 per cent. of the time of this last year of study is occupied with medicine and 25 per cent. with surgery, the allotment being reversible at the student's option. The remaining time is divided equally between obstetrics and gynæcology, pediatrics, and "electives"—the term for any branches of medical study which the student may elect to devote additional time to. Life is largely spent in

the wards and can be depicted by an example from what takes place under the heading of surgery. Here, an introductory course in the second year having prepared the students to serve as dressers, they are arranged in small groups in the third year, and serve in the various hospitals under instruction. This takes the form, in addition to ward work, of attendance at theatre clinics where actual patients are shown and diagnosis and treatment discussed over the human subject. There are also lectures and exercises in regional surgery, the whole being accompanied by instruction in rontgenology. In the fourth year the student, having in this case chosen to give the majority of his time to surgery, will find his time allotted in various proportions, and by agreement with his instructors, to general surgery, genito-urinary surgery, the pathology of tumour, rontgenology, and his voluntary courses. This procedure is followed, mutatis mutandis, in respect of all the main subjects of the curriculum, and everywhere the student is encouraged to make use of his time in accordance with, first, his need for general instruction, and secondly the call of his individual propensities.

Examinations and Promotion.

Speaking generally, the procedure described below is general in American universities where students are examined by their own teachers, by whom they are promoted, deferred, or weeded out according to the opinions formed of them.

Students are divided into four classes according to their time of study and proficiency, and any incompetent person may be asked to discontinue at any time. They are examined in each course and marked as determined by each department; they can anticipate the regular course of examinations and they pay fees for each additional examination incurred as the result of failure.

The instructors in the principal courses during the year hold a promotion board for each of the first three years. These boards mark each student for the corresponding school year, promote those who have satisfied the tests, interview, examine, and if necessary warn weak candidates, and have the responsibility of advising students to withdraw. The action of the boards appears to be final, but is not taken without due consideration. A student failing in two major subjects in one year will have to withdraw from the school, while passing in all the subjects at the minimum grade will not earn promotion. Failure, when not entailing rejection, puts the student under a "condition," and he cannot, in ordinary circumstances, proceed with the curriculum until the condition is removed by a successful re-examination. The promotion opportunities, however, are considerable, while chances for re-examination, sometimes of a special nature, are given.

Finally the committee on examinations gives a general examination to each candidate for the degree of M.D. and reports to the Faculty for graduation those properly qualified for the degree and for honours. The general examination consists of practical tests along all the line, including adequate clinical use of the medical sciences; and a student who fails to satisfy the examiner on three occasions is debarred from further attempts.

HOSPITAL TRAINING.

In 1810 the Medical School of Harvard was transferred from the suburb of Cambridge to Boston in order to secure the clinical facilities of the city. These facilities may be regarded as proportional to the number of patients in the hospitals who, being under the care of instructors on the staff of the medical school, are available for teaching purposes; and on this basis the school is closely affiliated with the hospitals now enumerated, three of which have been specially named already. Under the educational scheme each student comes into contact, under supervision, with patients in these hospitals from the second half of his second year until the close of his course, this contact becoming more intimate as the course proceeds.

The Massachusetts General Hospital.—The Massachusetts General Hospital was founded in 1813 and has been associated with the school since the foundation. It contains now 520 beds. A recent extension of the out-patients' department has connected up the Massachusetts Eye and Ear Infirmary with the general activities of the hospital, while the Nurses' Home, standing on the other side of one of the four bounding streets, communicates by tunnel with the administration block. Medical students are encouraged, in accordance with the pattern laid down for the supervision of their studies, to coöperate under suitable supervision in all the routine work of the hospital, and are present at the autopsies of the cases which have been under their direct attention, as well as at operations, general and special clinics, and theatre demonstrations. There are services in general medicine and surgery and in all the specialties, while the obstetrical work is done at the appropriate institutions. A large proportion of the out-patient work is done at the Boston City Dispensary, although this institution is used mainly for graduate instruction (Fig. 2).

Laboratories in pathology, chemistry, and X ray are maintained, and there is an excellent medical library, all of which are open to students in the Medical School.

The Boston City Hospital.—At this hospital, with 939 beds, all of which are available for teaching purposes, the Second and Fourth Medical services, the Fifth Surgical, and the Neurological service are under the direction of professors at the Harvard medical school. In addition there are divisions of pediatrics, gynæcology, and so on, open to students. In the out-patient department new patients furnish additional teaching material. Clinical laboratories are maintained for research, pathology, nephritic, diabetic, blood, pediatric, and neurological work, and basal metabolism. The X ray service is very large and important. There is an excellent library, including 73 current medical journals.—*The Boston City Hospital, South Department.* This hospital is for contagious diseases and occupies a block by itself adjacent to the Boston City Hospital proper. It has a capacity of 338 beds and has abundant material for clinical instruction. Students make ward visits three or more times a week. During the year 1926 there were 1787 cases treated, of which 813 were scarlet fever and 266 were diphtheria.—*Hospital Department: Sanatorium Division.* The Boston Sanatorium for tuberculous patients at Mattapan has recently become a part of the Boston City Hospital. It has a capacity of 422 beds and a daily average of 373 patients. During eight months of the year two to four fourth-year students of Harvard Medical School spend eight hours daily for one week in this hospital under the supervision of the resident physician.

The Peter Bent Brigham Hospital.—This hospital has been closely associated with the Medical School since its dedication in 1913. It is for general medical and surgical cases, and is situated on grounds adjacent to the medical school buildings. There are 246 beds, all of which are used for teaching purposes. There is also maintained an out-patient service for ambulatory medical and surgical patients to which 6192 new patients applied during the past year. There are well-equipped medical, surgical, and pathological laboratories. The hospital, by special arrangement, makes use of the library of the medical school.

The Children's Hospital.—This hospital, adjacent to the school, maintains a medical, surgical, orthopædic, nose and throat, and a well-babies clinic. There are 211 beds, of which 165 are available for teaching purposes. Well-equipped laboratories are provided for the study of material from the wards and out-patient service.—*The Infants Hospital (Thomas Morgan Rotch Jr. Memorial Hospital for Infants)* is

adjacent to and under the management of the Children's Hospital. There are 66 beds, all of which are available for teaching.

The Boston Lying-in Hospital.—This hospital occupies a building in Longwood-avenue, and of the 100 beds 65 are used for teaching. In the out-patient department, 1250 cases were attended last year, under supervision by third- and fourth-year students. A well-equipped laboratory is available.

The Free Hospital for Women, devoted exclusively to the surgical treatment of diseases peculiar to women, has a capacity of 94 beds, of which 74 are available for teaching, and a large out-patient department. Library and laboratory facilities are available.

Boston Psychopathic Hospital, a State institution for acute, curable, incipient, and doubtful cases of mental disease, has 110 beds, all of which are available for teaching, and receives patients at the rate of about 1800 a year. The hospital is equipped with psychological, neuropathological, and biochemical laboratories. The out-patient department receives patients at the rate of 1000 a year. In addition to the psychoses and neuroses the clinical material includes cases of mental defect and instability, and of delinquency.

The Massachusetts Eye and Ear Infirmary.—There are 209 beds in this hospital, 167 of which are used for instruction in diseases of the eye and ear. Nose and throat out-patient operations are done at the Massachusetts General Hospital. Pathological and X ray laboratories are maintained.

The Collis P. Huntington Memorial Hospital and the J. Collins Warren Laboratory of Bio-Physics.—This hospital and laboratory of the Cancer Commission of Harvard University afford opportunity for the study of human tumour cases. The 22 beds are all available for teaching purposes, and the aim of the hospital is to study special problems, more particularly in relation to early diagnosis.

II.—THE MEDICAL COLLEGE OF CORNELL UNIVERSITY.

Historical.

THE Medical College of Cornell University was established in 1898, when Colonel Oliver H. Payne gave several million dollars to the University for this purpose. The college was organised largely through the earnest efforts of Dr. William M. Polk, who became the first dean. It was established in New York City, which is about 300 miles away from Ithaca, N.Y., the seat of Cornell University, in order that the clinical facilities of the great municipal hospital and other institutions in New York should be enjoyed by the students. To bring about a closer coördination of the work at the University at Ithaca with that of the college, the various subjects comprising the first two years of study were offered both in Ithaca and in New York. Later the work at Ithaca was reduced to that of the first year, and departments of anatomy physiology, and biochemistry are maintained. All students are combined for the work of the second and subsequent years in New York.

The principal building is located immediately close to Bellevue Hospital, the main municipal hospital conducted by the City of New York. In this building are housed the departments of anatomy, physiology, biochemistry, pathology, bacteriology, and clinical pathology. The medical library, supplied with the more important medical periodicals in French and German, as well as in English, is also located in the main building. In this building is also the Cornell Clinic (Fig. 3), an out-patient department where all branches and specialties of medicine and surgery are represented. Over 140,000 visits are made to the out-patient department annually, which supplies an important part of the clinical training, and being in close contact with the various laboratory departments of the school, it furnishes material for research as well as for instruction. The Loomis Laboratory, a large building adjacent, affords quarters for pharmacology, experimental therapeutics, experimental surgery, and other fields of teaching and research.

In June, 1927, an agreement was entered into between the Medical College and the New York Hospital, forming the New York Hospital-Cornell Medical College Association. According to the terms of this agreement the two institutions are merged. A group of buildings are being planned which will afford a new and large plant for both the hospital and the college, overlooking the East River, adjoining Rockefeller Institute for Medical Research. Additional endowments have been secured by each institution concerned in the merger, and the entire activities of the medical school will be conducted in this plant. Separate buildings are designed for the various laboratory departments, and the hospital as planned will contain about 875 beds. Special provision is being made not only for medical and surgical departments, but also for psychiatry, obstetrics, and pediatrics. The Association is operated under the supervision of a joint administrative board composed of three governors of the New York Hospital, three representatives of the Trustees of Cornell University, and one other member elected by the appointed members. A director of the Association has been appointed in order to coördinate the activities of the medical school and hospital, and the Faculty and hospital staff are to form one body organised on a university basis.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

All students are required to have obtained the bachelor's degree or to be already seniors. In the latter case they have completed three years of college work, and are granted the bachelor's degree by the institution in which this work was done after completion of the first year in the Cornell college. Students are also admitted to the Cornell college who give evidence by examination of having acquired an education equivalent to that required for the bachelor's degree. Practically all students, however, enter after having had three or four years of college work, which must include, as a minimum, two years of chemistry, one year of physics and biology, and adequate training in at least one modern foreign language, preferably French or German. The classes are limited to 65. Students from other recognised medical schools are admitted to advanced standing when there are vacancies in the class to which they desire to enter.

SUMMARY OF STUDIES.

The medical year extends over eight months, from October to June. It is divided into three terms of approximately 11 weeks each. During the *First Year* courses in anatomy, biochemistry, and physiology are pursued. During the first two terms of the *Second Year* physiology, pathology, and bacteriology are the main subjects studied, with a few hours devoted to elementary medicine and surgery. During the third term of the second year pharmacology is studied, bacteriology and pathology are continued, more time is given to medicine and surgery, and introductory lectures to some of the special branches of medicine and surgery are held.

With the beginning of the *Third Year* instruction is largely confined to the clinical subjects, although pathology and pharmacology are continued. Instruction in public health is taught throughout the third year. All the work of the *Fourth Year* is done in the various hospitals and out-patient departments, controlled by or affiliated with the Medical College. For this purpose the students are divided into groups

of about ten students. These groups rotate through the various teaching services in the hospitals and out-patient clinics.

Examinations and Promotions.

Students are advanced in the course from one year to the next upon recommendation by heads of departments after examination in the work of that year, but examinations may, at the discretion of the head of the department, include all the work previously covered in the year or years preceding the examination in question. Examinations are held at the close of each academic year, except that in each course extending through a part of the year only the examination may be held at the close of the course.

A student who fails to pass more than 40 per cent. of the work of the first and more than 30 per cent. of the work of subsequent years is required to withdraw from the school. Students failing to pass less than these percentages of their work are re-examined at the opening of the following session. If they then fail to pass they are required to withdraw from the school. Under special but rare conditions, however, students may be permitted to repeat a year's work.

HOSPITAL TRAINING.

Clinical instruction is given in a number of hospitals, some of which are closely affiliated with the Medical College.

The New York Hospital, the oldest hospital in New York, has entered into an agreement with the school which assigns the pathological and half of the entire medical and surgical services to the Cornell University Medical College for the advancement of its teaching and research. The services of the New York Hospital are very active, and about 100 beds are available for the purposes of Cornell students. The staffs of these services are nominated by the Cornell Faculty.

Bellevue Hospital, situated directly across the Avenue from the Medical College, contains 1200 beds. The hospital is organised in four divisions, one of which has been placed by the trustees of the hospital at the disposal of the Cornell Faculty for medical instruction, which nominates the staff and assumes full responsibility of the clinical work. (See p. xi.)

FIG. 3.—THE CORNELL UNIVERSITY MEDICAL CLINIC.

Memorial Hospital is devoted to the study and treatment of cancer. The Cornell College is responsible for the medical and surgical activities of the hospital and nominates the professional staff. This hospital contains about 100 beds.

Clinical facilities are also afforded by the John E. Berwind Maternity Clinic, the New York Nursery and Child's Hospital, the Neurological Institute, the New York State Psychiatric Institute, and the Manhattan State Hospital for Mental Diseases.

III.—THE MEDICAL SCHOOL OF COLUMBIA UNIVERSITY:

COLLEGE OF PHYSICIANS AND SURGEONS.

Historical.

Columbia University was founded in 1754 by a grant from George II. of England, as King's College "for the instruction of youth in the learned languages and the liberal arts and sciences." The College organised a Medical Faculty some 20 years later and was the first institution to confer the degree of M.D., Robert Tucker and Samuel Kissam being the earliest graduates. In 1784, after the Revolution, the College was reorganised and named Columbia College of New York. In 1814, the re-established Medical Faculty of the College was merged in the College of Physicians and Surgeons, but until 1891 the conjunction was only nominal—since when, however, it has been definite. The College has just moved, to become an integral part of the new Medical Centre, a huge and imposing group of buildings on the bank of the Hudson River.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

A collegiate course of four years, terminating with a degree, is the most desirable preparation, but the minimum requirement accepted is attendance for two full years of at least seven months at a collegiate institution acceptable to the University. The subjects at which study by the students for certain hours is required are: physics, inorganic and organic chemistry, biology, and for two years at least English and either French or German. The time which this study has taken is calculated in semesters, and the credit requirements are very strictly adhered to, especially in the case of the admission of special students and those who desire to join as of advanced standing. The average admissions total about 12 per cent. of the applications. No students have been admitted for the last three years who have not to their credit at least three years of college work.

This pre-medical education can also be taken not only at other universities—the Rochester, the Colgate, and Hobart and Ripon Colleges may be mentioned—but can be carried out partly in a combined course with Columbia College. These universities give the M.B. degree to students, who after three years of work with them complete the other year in medicine in Columbia. We may note again the flexibility in reference to the admission of students, native or foreign, to advanced standing in the curriculum after the production of proper credentials, but any such student will be required to submit to examination at the pleasure of the Faculty.

SUMMARY OF STUDIES.

The following is an outline of the work required of the candidate for the degree of Doctor of Medicine during the four years of actual medical study. Each year is divided into three trimesters, the first two years as follows: Sept. 26th to Dec. 6th; Dec. 7th to March 1st; and March 9th to May 18th.

First Year.—The *first* period covers instruction in the elements of anatomy and histology, coupled with work in the laboratory and lectures; while the student is also introduced to biochemistry. In the *second* period, while anatomy is continued and special attention is being paid to neurological anatomy, physiology and biochemistry are the main subjects. The *third* period reviews both physiology and anatomy, the latter especially in the gross.

Second Year.—The *first* period is occupied in the study of pathology and bacteriology, both in the laboratory and through daily lectures. In the *second* period, of full three months, while pathology is continued and developed, the student is introduced to surgery and the art of physical diagnosis. In the *third* period, the continuation of surgery is associated with clinical pathology, psychopathology and pharmacology are introduced, as well as the principles of internal medicine. It should be noted that under the heading of pharmacology is included instruction not only in the action of drugs but in the elements of animal research. This is an invariable rule, and the same connexion is maintained in physiology and anatomy.

Third Year.—In the third, as also in the fourth year, the students are divided into groups, with an eye to a logical order of the main themes and the coördination of the work of each department. The education proceeds in the wards provided by the Medical Centre. There are theoretical and clinical lectures, demonstrations, and clinics in medicine and surgery, gynæcology, neurology, and practically all the important specialties which require particular study. The classes are divided into small groups for instruction in physical and medical diagnosis, and for practical work in the specialties.

Fourth Year.—During the fourth year, various groups of students attend for clinical instruction the wards especially of the Presbyterian and Bellevue Hospitals; while the obstetrical course is carried out at the Sloane Hospital for Women. Practically the whole of this year is spent in hospitals and institutions, mostly affiliated to the new Medical Centre, bedside instruction largely taking the place of general and clinical lectures. The students come into closer contact with the patients in order to apply the various diagnostic methods they have been studying. They learn how to take the history of the case, to arrive at diagnosis and prognosis by complete physical examination and watching the progress of cases, in the course of which they are expected to have an opinion upon treatment. It will be seen that this is a more precise way of stating that in the wards of the hospital the students carry out the duties of clinical clerks and dressers. Out-patient instruction is given at the Vanderbilt Clinic, where exceptional opportunity is afforded for studying all forms of acute disease in infants and young children. But all branches of medicine are represented at the Vanderbilt Clinic, which is the combined out-patient department of all the hospitals at the Medical Centre.

Much attention has been spent at this school over the instruction of students in the diseases of children, and teaching in the fourth year has now been largely concentrated at the Babies and Bellevue Hospitals. A follow-up clinic, established at the latter, offers another teaching resource, as the student is instructed in the management of the congenitally syphilitic child. Similar work is done at the Sloane Hospital, where also there is a follow-up clinic for premature infants. The student, it will be observed, therefore, is here introduced practically to the duties of social service.

Examinations and Promotions.

The procedure already noted in dealing with the medical course at Harvard University is adopted—with differences of detail, and with various assumptions of authority or displays of discretion and sympathy—at all the university medical centres. For a system of set tests at stated intervals by external examiners there is substituted one of continuous inspection under which students who fall behind their classes are dealt with. The regulations at Columbia may be reproduced as showing the general procedure regulating a student's advancement.

1. A student is not allowed to go on with his class who has failed in any one of his courses until he has removed that failure to the satisfaction of the head of the department.

2. (*a*) A student who has failed in two courses in the first year may be allowed re-examination in the two failed courses, provided that the two failures do not include both anatomy and biological chemistry.

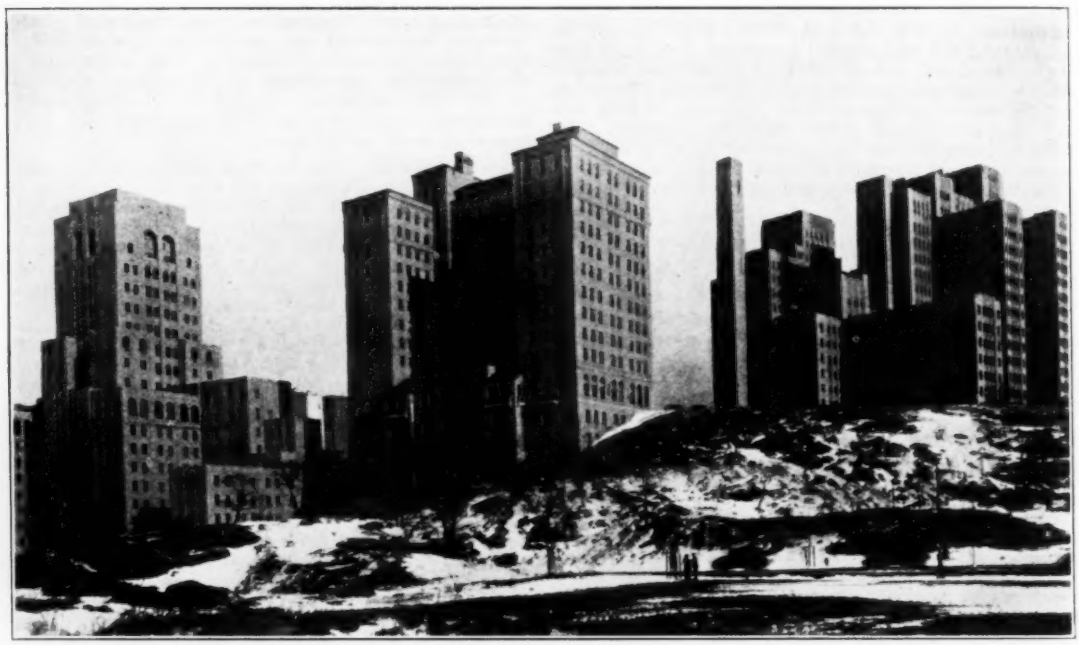
(*b*) A student who has failed in two courses of the second, third, or fourth years may be allowed re-examination in the two failed courses, provided that

the total hours of the two courses failed in do not exceed 33⅓ per cent. of the total course hours for that year.

3. A student who has been allowed re-examination and has failed in the re-examination must repeat the entire work of that year.

4. A student may repeat an entire year only once during his medical course, and may not repeat any other year later unless the Faculty of Medicine votes to suspend this rule in his case on the recommendation of the Class Faculty under which the student has been working.

FIG. 4.—THE MEDICAL CENTRE FROM THE HUDSON RIVER.



Left to right—the Psychiatric Institute and Hospital, School of Nursing, and combined Medical School and Hospital building.

HOSPITAL TRAINING.

The Medical Centre.

A permanent affiliation between Columbia University and the Presbyterian Hospital was accomplished in 1921. The two institutions have erected new buildings in close geographical and functional relationship on the large plot of land given to Columbia University and Presbyterian Hospital by Mrs. Stephen V. Harkness. This plot extends from 165th-street to 168th-street and from Broadway to Riverside Park, comprising about 20 acres.

In addition to the College of Physicians and Surgeons and the Presbyterian Hospital, the following institutions are represented at the Medical Centre: the School of Dental and Oral Surgery, Presbyterian Hospital School of Nursing, DeLamar Institute of Public Health, the Sloane Hospital for Women, the Squier Urological Clinic, the Vanderbilt Clinic, the Babies Hospital, the Neurological Institute, the New York State Psychiatric Hospital and Research Institute. This arrangement of buildings brings the various schools connected with medicine and allied subjects in close physical connexion with the hospitals, clinics, and institutes in which clinical instruction is carried on.

Presbyterian Hospital.—The Presbyterian Hospital, one of the general hospitals of New York City, was founded in 1868 for "the poor of New York City without regard to race, creed, or colour." Under the terms of its affiliation with the Columbia University was built at 59th-street and Amsterdam-avenue, and presented to Columbia University by Mr. and Mrs. William D. Sloane in 1886. In the new buildings it occupies three floors of the main hospital building. The wards of the hospital furnish 128 beds for obstetrical and gynæcological cases. Patients, other than emergency cases, are admitted to the hospital through the ante-partum and follow-up clinics of the hospital, or the Gynæcological Department at Vanderbilt Clinic. The hospital is under the direction of the Department of Obstetrics and Gynæcology, the executive officer of the department being the director of the hospital. The assistant professor, associates and instructors are the attending obstetricians and gynæcologists. The resident and assistant resident obstetricians and gynæcologists are also instructors in the department. Internes of the hospital serve for one year, and are selected from men who have already completed a term in a general hospital. The laboratory work of the hospital is carried on in conjunction with special laboratories of the Faculty. The heads of the various special departments in the Faculty are consultants of the hospital, and the attending physicians in the specialties are appointed from these departments. The deliveries in the hospital number about 1800 a year. The gynæcological service is run in conjunction with the gynæcological service of the Vanderbilt Clinic, and the attending obstetricians and gynæcologists of the Sloane Hospital are in charge of the clinic. The Social Service Department of the hospital keeps in close touch with patients applying for treatment, thus making it possible for students to study the end-results of operative cases and

Sloane Hospital.—The Sloane Hospital for Women

prenatal, intra-partum and post-partum care of obstetric cases. The care of the infants is supervised by the attending pediatrician.

The Squier Urological Clinic.—The Squier Urological Clinic occupies the entire eighth floor of the new hospital building. It is comprised of wards of 12, 5, and 4 beds, and contains a large number of single rooms for surgical cases in urology. The clinic is under the direction of the Department of Urology, the executive officer of the department being the director of the clinic. The assistant professor, associates and instructors are attending surgeons, and the resident and assistant resident are also instructors in the department. There are laboratories on the same floor, for the exclusive use of the Squier Urological Clinic, fully equipped to do diagnostic, X ray, bacteriological, pathological, fluoroscopic and research work, necessary for the care and treatment of patients. There are two large, especially equipped operating rooms and surgical clinics are held by the attending staff, throughout the year. The out-patient department of the clinic is situated in the Vanderbilt Clinic, and is under the direction of the attending staff of the Urological Hospital. The out-patient department is fully equipped for cystoscopic, X ray work, fulguration, diathermic and laboratory work. The Harkness Pavilion is available for the accommodation of private patients of the attending staff.

The Vanderbilt Clinic.—The Vanderbilt Clinic, presented by the Vanderbilt family to Columbia University in 1888, has become the common out-patient department for all the hospitals affiliated in the Medical Centre, and is a fully equipped dispensary for the sick poor. It affords ample material for extended practical clinical instruction in the various departments of medicine, as the professors, with their clinical assistants, have the entire charge of its practice. The building is so arranged that each department has rooms for practical instruction to students in small sections. All modern appliances for the treatment of diseases have been introduced, so that students can learn the modern technique in each of the special departments of medicine.

St. Luke's Hospital is a general hospital of first-class standing, with 411 beds, while *St. Mary's Hospital*, a free hospital for children, has 134 beds. Out-patient attendance is optional at either institution.

The Neurological Institute and the *Babies Hospital* are in course of construction and new buildings will house these two institutions. It is expected that both will be completed during the coming academic year.

IV.—THE MEDICAL SCHOOL OF NEW YORK UNIVERSITY:

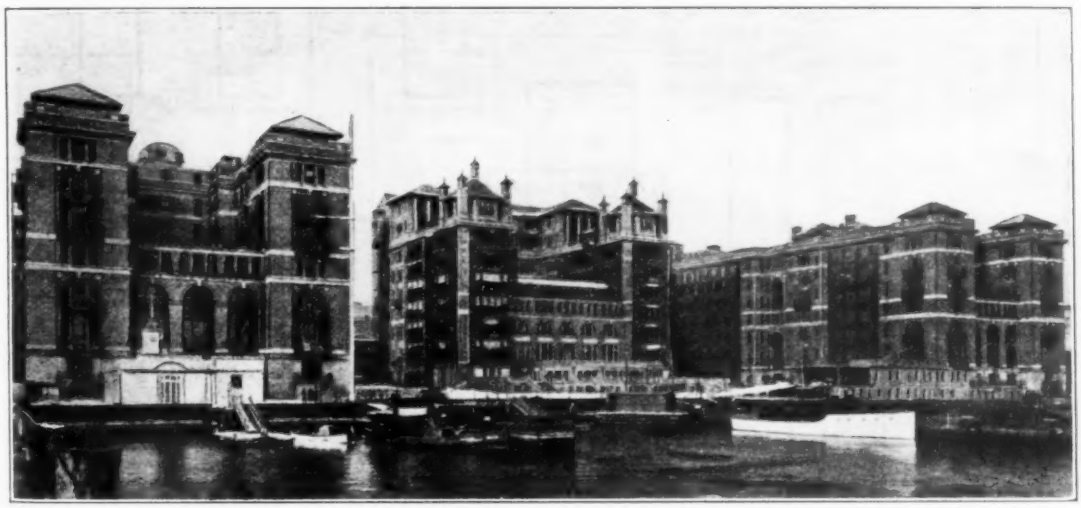
BELLEVUE HOSPITAL MEDICAL COLLEGE.

Historical.

THE University was established in 1898 by the Union of the University Medical College and the Bellevue Hospital Medical College. Instruction was first given in the former in 1841 and in the latter in 1861. The College occupies five large buildings diagonally opposite to Bellevue Hospital, and is officially known as the University and Bellevue Hospital Medical College.

The College building was erected by the Medical Faculty of Bellevue 30 years ago to meet increasing demand for such facilities and was transferred to New York University at the time of the consolidation. Adjoining it is the Carnegie Laboratory, a gift to the Bellevue by the late Andrew Carnegie. The main building, six storeys high, accommodates part of a vast clinic for the outdoor sick poor, while on various floors are research laboratories, working libraries, with an anatomical department on the top floor, having well-lighted and ventilated dissecting-rooms. The Carnegie Laboratory was extended some 20 years ago, again by the gift of Andrew Carnegie, while a large laboratory has been erected to serve as a centre for hygiene and public health. Part of the new laboratory and of the Carnegie Extension serve as an immense out-patient clinic for general medical and surgical cases, diseases of women, and various special pathological conditions. It will be seen that an almost unlimited amount of clinical material lies under the hand of the medical students of the College.

FIG. 5.—BELLEVUE HOSPITAL FROM THE EAST RIVER.

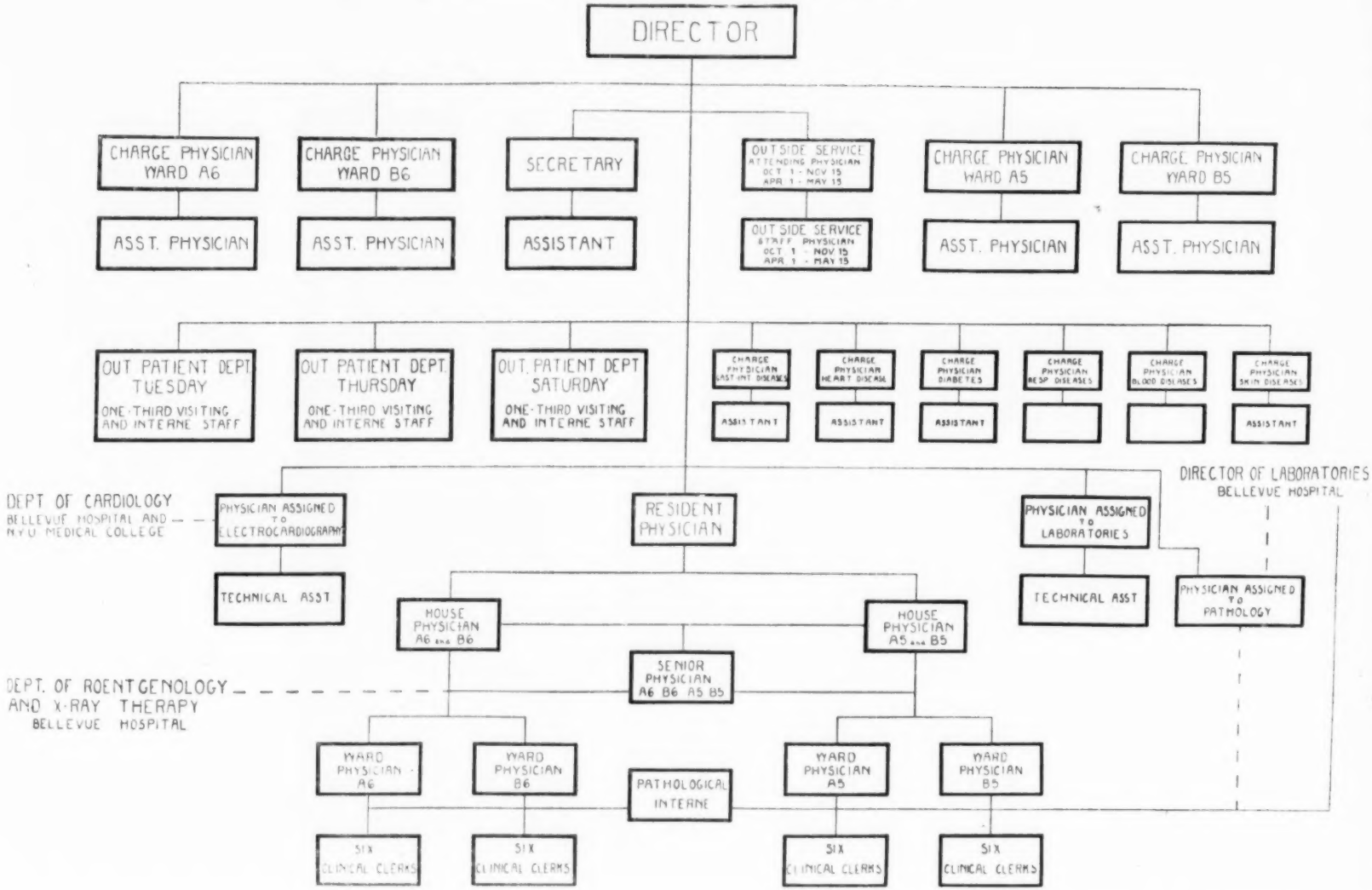


THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

The minimum requirement for admission to the University is 72 semester hours of college work, all of which must be of a sort to count for a baccalaureate degree. This period is divided up into the times of study allotted to chemistry, physics, biology, English composition and literature, and a reading knowledge is demanded of one of the four great European languages—French, German, Italian, and Spanish. Where the applicant has reached all but the last year of university graduation, part of his medical training will count as a fourth year at his university. But while these constitute the minimum requirements for entrance, it is considered that a college course of four

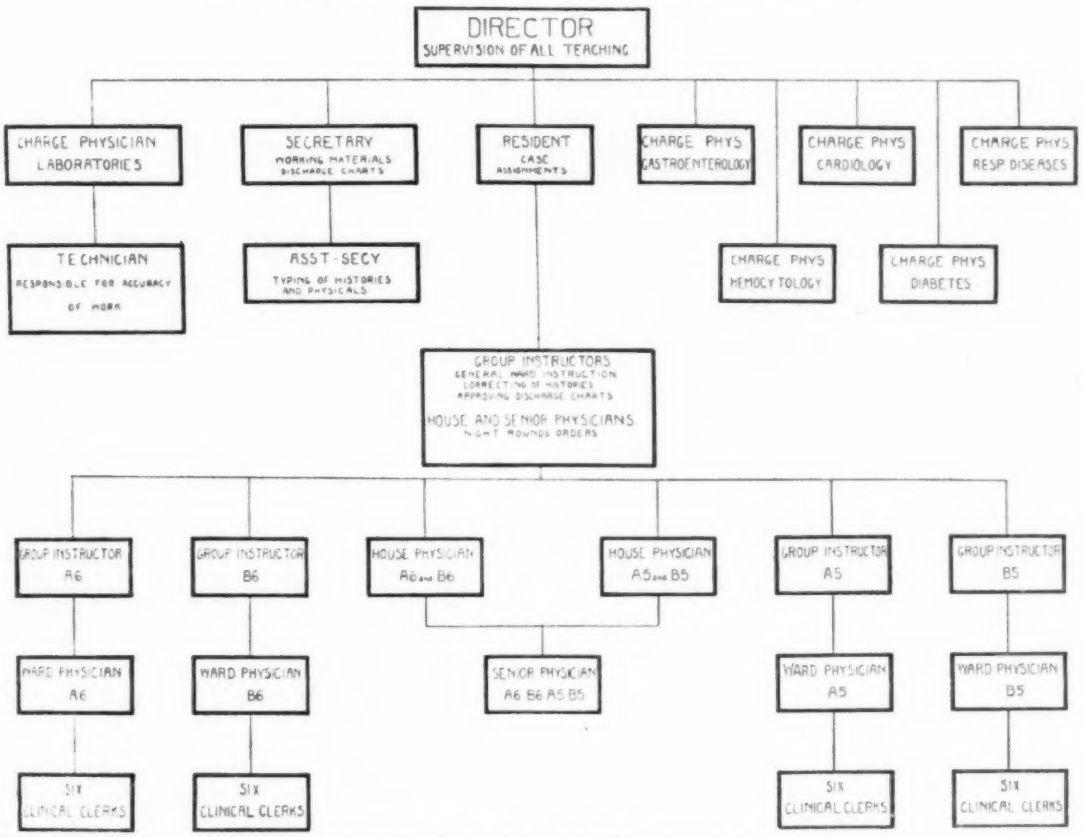
FIG. 6.—CLINICAL ORGANISATION AT BELLEVUE HOSPITAL.



years is the most desirable preparation for the study of medicine, so that preferential consideration, when the students are selected, is given to those of higher scholarship attainment. During the past four years only one student has been admitted who was not eligible for a bachelor's degree at the end of his first medical year. This point should be noted, as the pressure on the school is very high, the last figures being 125 men selected out of 800 applicants.

The same flexibility prevails here as at the Cornell and Columbia Universities, inasmuch as successful students in other colleges are eligible for admission to advanced standing, save in the final year.

FIG. 6A.—TEACHING ORGANISATION AT THE BELLEVUE HOSPITAL.



The interrelation between the clinical and teaching duties of the staff will be followed at once on understanding that the assistant physicians in the previous schema are the group instructors in this schema.

SUMMARY OF STUDIES.

The following outline shows the work required of the candidate for the degree of Doctor of Medicine during the four years of actual medical study.

First Year.—This period covers instruction in anatomy, microscopic and gross, and the principles of physiology; teaching develops the pupil's knowledge of chemistry and introduces physiology. Before admission to the second year's study the student must present evidence of having satisfactorily completed the relevant laboratory courses, as well as pass examinations in these subjects. Here the weeding-out process by the instructors begins to take place.

Second Year.—The main subject of the second year is pathology, while physiology is continued, and pharmacology, with its associated study of animal research, is brought into the curriculum. The other teaching, both formal and practical, covers bacteriology and immunology, while the groundwork is laid in applied pathology and surgery. The students cannot enter the third year classes until they have satisfactorily completed laboratory courses in normal and pathological histology, and bacteriology, chemistry, physiology, and pharmacology, while they must also have completed their work of dissection. In addition to the certificate in respect of laboratory courses, they must pass examinations in the subjects mentioned, and then further weeding-out takes place.

Third Year.—In the third year the time is mainly occupied by the general study of surgery, medicine, and physical diagnosis, although a reasonable proportion of time is devoted to obstetrics and gynæcology. With the exception of rontgenology, special neurology, and psychology, all the special departments of medical science are brought to the notice of the students, who cannot enter the final year of study until they have passed written examinations upon these subjects and practical examinations in gross and applied pathology.

Fourth Year.—The time of the fourth year, being spent practically in the wards of the Bellevue, is largely devoted again to surgery, medicine, gynæcology, and obstetrics, but considerable stress is laid at this period upon pediatrics and neurology. At the end of the fourth year the student passes examinations, written and practical, in these various subjects, while his standing is also influenced by the record of his work in classes or wards.

Examinations and Promotions.

At the end of each of the four years of the curriculum the standing of the student is determined by written and practical examinations and by records of work in laboratory or hospital ward. The students are advanced from one year to the next in accordance with the results at the close of each session, and the work of

each year is separately considered, those who fail to pass examinations satisfactorily at the close of any period being unable to proceed to the next period until re-examination at the beginning of the new college year has justified the promotion. Repeated failure implies rejection from the school.

HOSPITAL TRAINING.

The Bellevue Hospital.

The students of the Medical Faculty of New York University are ranged under the Third Medical Division of the hospital, the Second Medical Division comprising the Cornell students, in dealing with whom general notes on the institution were made. But those notes will soon be out of date, for although the hospital is one of the largest in the United States and has always been distinguished for the abundance of its clinical material, New York City has authorised an enormous appropriation under which the capacity of the institution will be extended to nearly 2000 beds. The present appearance presented by the hospital from the East River shows its imposing character.

FIG. 7.

This doorway in the Bellevue Hospital buildings formed part of the Balcony of the Federal Hall over which Washington delivered his first Inaugural Address on April 30th, 1789.

The members of the Faculty, who are attending physicians and surgeons to the hospital, hold regular clinics for students in the large theatres, and small sections of the classes are taken into the wards to examine medical and surgical patients. Students of the fourth-year class are regularly assigned to the care of cases in the wards under the supervision of the attending and house staffs. Many of the great charitable institutions receive their convalescing or chronic inmates through Bellevue Hospital or its out-patient department, in which more than 75,000 new patients a year are treated.

There is within the College building a medical and surgical dispensary, affording abundant material for practical clinical instruction connected with which are all the necessary laboratories, including a fine X ray department.

The diagrams given herewith set out the clinical and teaching organisations under which the Third Medical Division operate at the Bellevue Hospital, from which it will be seen how intimately the instruction of the students is a definite part of the management of the hospital.

V.—THE MEDICAL SCHOOL OF YALE UNIVERSITY.

Historical.

THE school of medicine was organised initially as early as 1710, when a charter was granted by the Connecticut General Assembly for the Institution of Yale Medical College, to be conducted under the joint supervision of its own President and the Connecticut Medical Society. Although the institution was formally opened in 1813, the medical school of Yale College did not take its real shape until 70 years later, when by amicable arrangement with the society the control of the College fell completely into the hands of the medical school; so three years later the title was adopted of Yale University, the present official designation being the Yale University School of Medicine.

The medical curriculum was at first purely academic, but the necessity of clinical instruction for proper medical training had been early recognised, and an agreement was come to with the New Haven Hospital to that end. As recently as 1914, through the beneficence of the Anthony M. Brady Memorial Foundation, a fund was established and an agreement made whereby the control of the clinical department of the hospital became vested in the medical faculty of the University. The general administration of the school of medicine is to-day in the hands of the Dean of the medical faculty and the permanent officiate of the school, acting with the approval of the Yale Corporation.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

The objectives of the curriculum do not fall exactly within the pattern with which these notes have made us familiar. A recent pronouncement by the Dean indicates the difference epigrammatically: "The phrase," he said, "recently coined in a publication on American education, namely, 'Save your coupons and get a diploma,' has no place in our educational system," and the experience at Yale indicates that an inelastic stratification of the curriculum may not be advisable. None the less, such definite plan as is laid down presents, as it must, some of the main features of the plan at other centres.

The requirements for admission are the usual ones—that is to say, three years of college work are taken to represent adequate preparation, granting that the studies have been followed in approved places. Credentials are required, and admission to advanced standing is controlled by qualifying tests. The compulsory subjects are physics, chemistry, and biology, together with mathematics taken up to a point where the elementary principles of the calculus can be comprehended. Importance is attached to humanistic studies, and a knowledge of English, and of French and German up to a point, is expected.

Under the general plan, the subjects of the medical and biological sciences are arranged in two groups, those embracing the basic subjects and those which deal particularly with clinical medicine; when the students have decided upon which field they intend to enter they can elect to take courses accordingly. These courses are divided into two periods of rather more than two years, the first of which, that devoted to basic study, is common to all the students, while the second period is employed in special directions.

SUMMARY OF STUDIES.

The First Period.—Ordinarily, students take the subjects of anatomy, physiology, and physiological chemistry before the subjects of pathology, bacteriology, and pharmacology; but the students, on testing, are allowed to arrange their curriculum in accordance

with their previous training and their personal bent, under a system of electives.

The Second Period includes the broad field of clinical medicine, training being here given at

It will be seen that the course cannot be reduced to any pattern similar to the routine of education laid down elsewhere, while it puts a premium on the student, at the very commencement of his career, who knows what he

FIG. 8.—NEW HAVEN HOSPITAL FROM THE NORTH-EAST.

conferences, clinics, and in the out-patient department. In the first clinical year the students serve as clinical clerks, rotating by section in the wards of the New Haven Hospital for two terms, the third term of the year being at their own disposal, to be used either in studying the basic subjects or in pursuing one of the

wants. To such an intending doctor the freedom in electing the places where he wishes to concentrate will be a great stimulus, but the responsibility on the authorities who permit him to exercise such discretion is proportionately great. To take two examples. Under the heading "Anatomy," the student has to

FIG. 9.—NEW HAVEN HOSPITAL FROM THE SOUTH-EAST.

branches of clinical medicine, that is, internal medicine, general surgery, gynæcology and obstetrics, or any of the various specialties.

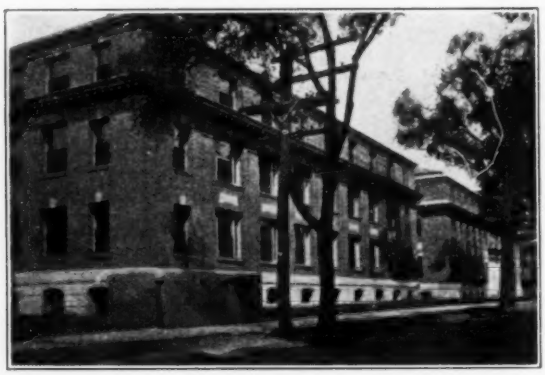
During the second clinical year, students rotate in the out-patient department while using still larger opportunities to take elective courses; indeed, it seems possible for a student to spend the major part of the concluding phase of his training entirely in elective work.

satisfy the demands of a required course during his first two terms. It is chiefly a laboratory course under the supervision of instructors, with conferences correlated with the laboratory work. Gross, microscopic, and developmental anatomy are so combined that the student, while working on the gross anatomy of a part, studies also its microscopic structure and developmental history. In this way a complete picture of an anatomical region is obtained. Two

students dissect an entire cadaver, each being assigned to a lateral half, and all the students will be found working on the same part at the same time. The microscopic structure is studied by means of fresh and stained tissues and the fundamentals of histological technique are included. The study of the development is based largely on preparations from the chick, pig, and man. The anatomy of the central nervous system is given as an integral part of the course and comprises gross and microscopic studies of the human brain and spinal cord, with special emphasis on functional relationships.

This is an ideal general training on the subject, and many would decide that it is sufficiently special in its

FIG. 10.—ANTHONY N. BRADY MEMORIAL LABORATORY.



directions; but the student, confronted with his first direct medical study, can elect to follow that study along 31 different branches by special arrangement.

The subject of public health has similar opportunities for specialisation, though here the student, being in the second period of his studies, may be assumed to know better where his bent lies. The instruction in this subject in the Brady Memorial Laboratory runs thus: The first half of the course is designed to equip the physician for his function as a hygienic adviser to the family, dealing particularly with the environmental factors which affect health, such as the sanitary control of water, milk, and other foods, the disposal of wastes, and the control of communicable diseases. The second half deals with the organised community health programme and the relation of the physician to the work of official health administrative agencies, medical supervision of school-children, problems of industrial hygiene, and infant welfare and antituberculosis movements. But he can elect to follow up 19 subjects falling under the general heading of public health.

Similar opportunities for early specialisation occur throughout the curriculum and may be taken as a feature of the Yale course.

The Examinational System.

Students having acquired, and proved the acquisition of adequate knowledge of the sciences upon which clinical medicine is based, enter for a general qualifying examination to prove that they are able to correlate and utilise knowledge of the various medical and biological sciences as a basis for the study of disease. A student may present himself for this examination when, in his opinion, he is prepared for it. Students failing in this examination *may* be granted the privilege, after further preparation, of taking the examination a second time. A student who fails twice in the qualifying examination will not be allowed to continue in the school of medicine. Thereafter he must show his knowledge of clinical medicine and laboratory technique. Later on, examinations given by the Faculty of Clinical Medicine must be successfully passed and a satisfactory thesis written, while knowledge of their elective subjects has to be displayed.

HOSPITAL TRAINING.

Instruction in clinical medicine is given in two groups of courses. The first group, required of all students, is designed to provide opportunities for the student to acquire, in logical sequence, a sound knowledge of the principles involved in medicine and experience in the study of the natural history, diagnosis, and treatment of diseases. The student body is divided into sections for these courses, which include clinical clerkship in the hospital and attendance in the various services of the dispensary. The second group, elected by students in accordance with their interests and ability, provides opportunities for advanced work in the particular fields of clinical medicine—internal medicine, surgery, pediatrics, obstetrics and gynæcology, and psychiatry. These courses, which are repeated throughout the year, are largely practical in nature and limited to small groups of students. Instruction is further extended by clinics and conferences arranged to afford comprehensive reviews of knowledge.

The New Haven Hospital.—The clinical courses of the students are conducted in this hospital, which has 400 beds, but, like all its similars in the United States, is contemplating great enlargement. The institution comprises, in addition to an administration building and a recently opened private pavilion of 54 beds, a medical, surgical, and gynælogical block, a pediatric ward, and rooms devoted to treatment and diagnosis. The four services thus indicated are staffed by the faculty of the school. The medical service, in addition to 40 beds for the usual diseases, has 34 beds in a contagious pavilion. Surgery has available 109 beds, and gynæcology and obstetrics occupy 78 more. Sixty-one beds, of which 34 are in an isolation building, are devoted to pediatrics.

The *University Clinic* is alike used for instruction in the school and as a dispensary. Instruction is there given by the whole faculty in general surgery and medicine, and all the specialties, and while the laboratory facilities of the hospital are available to the clinic, there is also a laboratory for medicine and pediatrics in the grounds of the hospital, equipped for both routine work and research.

The *Brady Memorial Laboratory*, the gift of the family (Nicholas F. Brady B.A. 1899, and James C. Brady, B.A. 1904) of the late Anthony N. Brady, of Albany, N.Y., was completed and occupied in 1917. In 1928 an extension of this laboratory, together with two additional wings to be known as Lauder Hall and Farnam Memorial Building, was made possible through a gift from the General Education Board. These buildings are on the grounds of the New Haven Hospital and conform in architectural style with the administration building of the hospital. The Brady Laboratory and Lauder Hall serve as the centre for instruction in bacteriology, pathology, and public health. The former contains, in addition, an auditorium, a museum, and an autopsy suite. The serological work of the hospital is also done in Brady Laboratory, and the School of Nursing has classrooms and offices on the first floor. The Farnam Memorial Building adjoins Lauder Hall and is connected with the surgical and obstetrical wards of the New Haven Hospital. This building contains an auditorium, offices, classrooms, and laboratories for the divisions of surgery and of obstetrics and gynæcology. Treatment rooms in the basement and first floors for physical therapy, heliotherapy, cystoscopy, and accident cases, and an operating suite on the fourth floor, including rooms for operative obstetrics, provide additional facilities for the hospital.

VI.—THE MEDICAL SCHOOL OF THE UNIVERSITY OF PENNSYLVANIA.

Historical.

The School of Medicine of the University of Pennsylvania is the oldest in the United States. It was founded in 1765 by Dr. John Morgan, who became its first Professor of Medicine, and who prophesied its future strength in his opening address. Morgan was the pupil of John Hunter, and of William Cullen, of Edinburgh, and it was from Edinburgh that the new school derived its chief inspiration. For a period the headquarters were at various places in the city—among others, in the Presidential House built for George Washington—but in 1873 the school moved to a site adjoining the Philadelphia General Hospital, familiarly known as "Blockley." Then the University Hospital, the first hospital in the United States erected for the use of a medical school, was built, and since then the story has been one of continuous development. Various departments, suitably housed, have made their appearance, with appropriate laboratories, and a large quarter of the city has become a medical centre. The Robert Hare Laboratory of Chemistry, erected in 1877 and at one time the home of the Dental School, now houses the General Chemical Laboratories of the School of Medicine, the Laboratory of Physiological Chemistry, and, on the top floor, the dissecting-room. In 1892 the Laboratory of Hygiene was built, and in 1904 a building was erected to accommodate the Laboratories of Pathology, Physiology, and Pharmacology. The Robert Hare Laboratory will be shortly vacated, as a new building is under construction, attached to the present Laboratories of Pathology, Physiology, and Pharmacology, and this will house the Departments of Anatomy and Physiological Chemistry. The Wistar Institute of Anatomy and Biology, incorporated in 1892, was the first American university institute devoted to advanced study and research in anatomy and biology.

In 1894 the William Pepper Laboratory of Clinical Medicine was erected adjoining the University Hospital, and provides facilities for the prosecution of minute clinical studies and original researches. The Henry Phipps Institute for the study, treatment, and prevention of tuberculosis, was established in 1903; the building, located at Seventh and Lombard-streets, was completed in 1913, and organised and equipped for its university connexion.

In 1909 the University of Pennsylvania originated the first graduate courses in Public Health leading to a degree of Dr.P.H., the Laboratory of Hygiene being erected for the research work and teaching, while the Department was established in 1920. In 1910 the Department of Research Medicine was organised, and in 1916 a "merger" between the Medico-Chirurgical College of Philadelphia and the University of Pennsylvania was completed, and the Graduate School of the University was organised, while two years later the Philadelphia Polyclinic and College for Graduates in Medicine merged with the Graduate School to form a Polyclinic Section. The whole story, it will be seen, is one of the pooling of efforts, and along this policy the future of the Medical School of the University is being designed.

The Medical Curriculum.

Matriculation and Requirements for Admission.

The minimum requirements are a standard four-year high school course or its equivalent, plus three years in an approved college of arts and science, aggregating not less than 45 units, a unit of college work being the same as a semester—namely, the equivalent of one hour of lecture or recitation each week for the full academic year or of two hours of laboratory work each week for the same period. The candidates must have the following credits or satisfactory certificates or proof of having passed an examination in these subjects: chemistry, physics, zoology or general biology, English, and either French or German. The credits should show that the applicant has done appropriate laboratory work in the three science subjects. Students can be admitted to advanced standing, that is to say, can enter in the second and third year classes, on proof that they have satisfactorily completed courses equivalent in kind and amount to those taken by the class to which admission is sought. Only 110 students are admitted yearly, though at least eight times that number make application.

Summary of Studies.

The course of medical instruction proper extends over a period of four years, and the subjects of the first two years follow upon each other in logical sequence.

First Year.—The time is devoted chiefly to anatomy, gross and detailed embryology, normal histology and neurology, physiology, and physiological chemistry.

Fig. 11.—University of Pennsylvania.

Administration Building.

Students are taken in sections, and the instruction in physiology may be used as an example. It covers work on the circulation and respiration and on metabolism, while laboratory work on frogs and the turtle heart is amplified by experiments on the students themselves; so a gradual course is arranged from foundation to coping.

Second Year.—The subjects are pathology, bacteriology, and pharmacology, under which is implied all inquiry into practical therapeutics conducted by animal research. Instruction upon all the subjects of the first two years is almost entirely practical, so that the greater part of the student's time is spent in the laboratory; but a simultaneous introduction is made to clinical work, for once a week throughout the first and second years an elementary medical clinic is given, while a surgical clinic is given in the last half of the year to demonstrate to the students the proper relation of the fundamental sciences to the practical work of healing. Limitation of the first and second year classes to 110 students prevents the possibility of overcrowding the laboratories and ensures a large amount of individual instruction. The major part of instruction in pathology is concentrated in the latter two-thirds of the second year, courses correlating the teaching with ward work extending over the concluding years of the curriculum. In the second year, general and systemic pathology, including parasitology, is lectured upon and demonstrated by teachers,

care being taken to present aspects of the subjects not always contained in text-books and, as far as possible, connected with recent observation. The autopsies at the University and Philadelphia General Hospitals are attended regularly.

Third and Fourth Years.—With the beginning of the third year, detailed instruction in the three great clinical subjects, medicine, surgery, and obstetrics, and in the various specialties, occupies the student's time; and, just as there is no sharp dividing line between the work of the first and the work of the second year, so there is no sharp dividing line between that of the third and that of the fourth year. While the major part of instruction in pathology is concentrated in the latter two-thirds of the second year, in the third year clinico-pathologic conferences are held; patients presenting unusual points of interest

FIG. 12.—UNIVERSITY OF PENNSYLVANIA.

Completed block of new hospital.

are presented for debate by the staff, at which groups of students are present.

The main work of the students during these years is in the wards of the hospitals especially connected with the University—namely, the University Hospital, Philadelphia General Hospital (Blockley), and the Pennsylvania Hospital. The students are now separated into ward groups, and as the various teachers and their assistants are in the wards of one or other of these institutions practically all of each morning, the students are under supervision constantly, and advice is always at their disposal. In medicine they take histories of new cases which are allotted to them, and make physical examinations of each case as it is assigned to them, and they see any special treatment which is produced in the ward. Each student attends special departments of one of the out-patient departments, and in this way gets three months' experience, working there three to five hours a day. Lectures are given throughout the third year which assist the student in his systematic reading to accompany the more intensive clinical work in the fourth year. Each student of the fourth year class works in the clinical laboratory, making routine examinations of all material from patients assigned to him in any of the departments during his final year. At small clinics a case-history will be debated by the fellow students of the reporter, in the presence of the professor, who examines the class upon the diagnosis arrived at and gives reasons for his own views.

The course of instruction in surgery is distributed over two and a half years, for it starts in the second year with an introduction to clinical problems. The third year instruction deals with surface lesions and lesions of the extremities, and lesions of the cranial, thoracic, and abdominal cavities are considered in the fourth year. Every patient admitted to the wards is assigned to whoever takes the history, and the clinical clerk or dresser will follow the patient throughout his stay in the hospital, attending the operative clinics on the cases which have been assigned to him for history-taking. In the closing phase, the student, having mastered the principles of wound repair, anæsthesia, asepsis, antisepsis, hæmorrhage, and shock, attends special units of the out-patient departments, while he is required to make routine laboratory examinations. A course of operative surgery is given on the cadaver. During the fourth year the student, who has been trained in pelvic diagnosis and obstetric procedure on the manikin, attends ten labour cases at least, as well as lectures on gynæcology and conferences upon gynæcological cases recently admitted to the wards.

Examinations and Promotions.

The personal supervision that is possible by the teachers over small classes of students with whom their association is so close makes the processes of weeding-out and of advancement very thorough. The Dean is the last authority in all circumstances, and an interesting sidelight on his responsibilities is thrown, in this University, by the assumption that some of the students may be partly supporting themselves by paid work in what is called their "spare time." By periodical examination the students are placed in category, promoted or referred to their studies in accordance with their instructors' opinions, or rejected. The student who falls behind through stress of private circumstances cannot be categorised as either idle or dull, and wherever possible he is helped, so that the undue strain may be removed.

HOSPITAL TRAINING.

There are three hospitals in the city of Philadelphia at which the students may complete their curriculum—namely, the University Hospital, the Philadelphia General Hospital, and the Pennsylvania Hospital.

The Hospital of the University of Pennsylvania was founded in 1874 and now contains 540 beds. As is the invariable case in the large general hospitals at these great medical centres, the alterations of buildings and the rebuildings have been immense, and to-day both the general, and especially the surgical aspects, are represented in large and well-organised departments, while 22 internes are required to cover the growing demands, as well as six residents. The students, in accordance with the scheme of the curriculum described above, receive clinical instruction in small groups, while larger sections are taken by the professor or his associate over more general ground. The classification of patients treated in the two great medical and surgical departments shows that the training is fundamental, while the departments of gynæcology, pediatrics, ophthalmology, neurology, and orthopædics have adequate facilities. At the laboratories of clinical medicine and surgical pathology bench instruction is given, so that familiarity is obtained with the routine examinations and with the methods in which the numerous tests required by practice in the wards are carried out. There is a department of physiotherapy, and annexed to the hospital is the fine William Pepper Laboratory. Further developments are contemplated in view of new buildings, while the large out-patient department has been recently reorganised, and the dispensary service divided into a general diagnostic section, and a number of special clinics.

The Philadelphia General Hospital.—The hospital stands immediately adjacent to the University buildings, and can well be designated a hospital of the University, a large proportion of the students being always engaged in taking their clinical courses there. The ancestor of the hospital was the "Bettering House" or "Almshouse for Relief and Employment

of the Poor," which from 1767 to 1834 served the purposes of the English workhouse and its infirmary. This building was superseded by a general hospital and lunatic asylum, known for local reasons as "Blockley," and this in its turn has been largely replaced by the enormous modern hospital which is nearing completion. It has 2000 beds, and is constructed with complete thoroughness upon the most modern design. Clinical instruction to the students is indicated by the subjects with which they are to make themselves familiar during the third and fourth years of the curriculum.

FIG. 13.—UNIVERSITY HOSPITAL: THE SURGICAL PAVILION.

An example of a morning's work may be given. The visiting staff officer attended by an interne, the clinical clerk, to whom the duty of reporting the case has been assigned, and a small group of students who have reached the final stage of their course meets the professor, who is also a full physician or surgeon to the hospital. The clinical clerk reads his notes in the presence of the patient, who may, if necessary, be examined. The notes contain a history of the patient, the signs and symptoms on admission, and the results of the laboratory tests that may have been necessary. He is then asked for his diagnosis, when the rest of the class are invited to comment upon their contemporary's work and to suggest alternative diagnoses. All these speculations are then reviewed by the member of the staff who may, for example, rule out one theory as being obviously contradicted by the history, and a second view as being not supported by the symptoms, and so on, until the final diagnosis remains between two or three possibilities. The professor then indicates to the class the reason for his own selection, or he may say that to make any such selection is unsafe without further information. In particular the professor might ask for more assistance from the laboratory than his clinical clerk could supply. Finally, he indicates to the class what sort of information from observation in the wards or findings in the laboratory

he hopes to obtain, and recommends certain places in medical literature where his hearers can read trustworthy accounts of the condition in question. The small clinic thus described is typical of many similar procedures not only in other departments of this hospital, but throughout all the teaching hospitals in America. That this sort of training, more or less of it, is going on in all the centres described may be taken for granted.

The Pennsylvania Hospital.—This institution was founded in 1751, and to it the same story of progress may be applied. It has all the departments necessary for the student's curriculum, and especially a notable neuropsychiatric clinic.

The Episcopal Hospital, a general hospital with 450 beds, is also at the disposal of University teachers and students.

VII.—THE JEFFERSON MEDICAL COLLEGE.

THE Jefferson Medical College was organised in 1825 and in 1828 received a University Charter from the State making it an independent Corporation with the same status as the University of Pennsylvania. The College buildings consist of a medical hall, with lecture rooms, theatres, a museum, a library and laboratories, and special class rooms. On the uppermost, or sixth floor, in addition to the museum are an animal room and the research laboratory of the professor of preventive medicine and bacteriology. The library proper contains more than 6000 volumes, and another library, the Daniel Baugh Library, contains 1200 further volumes dealing with anatomy and embryology.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

Candidates must present evidence of having completed a four years' course at an approved high school and two years at an approved college of art or science, the evidence being held satisfactory by the usual semester and credit proofs. The two years at college must have been spent in acquiring ground work in inorganic and organic chemistry, physics (where it is urged that the course should be preceded by mathematical study including trigonometry), biology and English, the additional subjects recommended being a modern language, comparative vertebrate anatomy, psychology, and social science.

SUMMARY OF STUDIES.

The medical course of four years is so arranged that the student is being trained throughout in the fundamental and practical sides of his future calling.

First and Second Years.—The first two years are devoted mainly to the fundamental medical sciences, which serve as a basis for the technical and clinical studies that follow, the larger part of the time being spent in practical work in the laboratories. Emphasis is laid upon the laboratory instruction in anatomy, histology, embryology, physiological chemistry, physiology, hygiene, bacteriology, pathology, pharmacy and pharmacology. For laboratory instruction each class is divided into three groups, thereby affording greater opportunities for individual instruction. All courses are obligatory, and satisfactory work and attendance constitute a requirement for admission to the written examinations. As the ultimate object of the study of medicine is practice, the student, during the *Second Year*, is instructed in the fundamental principles of clinical medicine and surgery, in order that the correlation between theory and practice may be established in his mind early in the course.

Third and Fourth Years.—The laboratory courses are correlated with the clinical branches considered in the third year. During the fourth year the teaching is largely clinical and practical. The fourth-year class is divided into sub-groups of 10 or 12 men, who receive instruction at the bedside and in the dispensaries of the College Hospital and its departments, as well as in other hospitals. Didactic lectures and recitations are given in the Medical Hall on practice of medicine, physical diagnosis, surgery, obstetrics, gynæcology, materia medica, therapeutics, neurology, chemistry, physiology, pathology, bacteriology, medical jurisprudence, hygiene, pediatrics, genito-urinary diseases, orthopædic surgery, ophthalmology, and tropical medicine.

In the College and Laboratory Building, laboratory instruction is given in physiology and pharmacology, physiological chemistry, pharmacy, pathology, including morbid anatomy and pathologic histology, bacteriology, hæmatology, bandaging, major and minor surgery, obstetric manipulations, clinical chemistry, and microscopy. Courses in anatomy, applied anatomy, dissection, histology, embryology, and operative surgery are given also, while in the theatre there are clinics on general medicine, surgery, obstetrics and gynæcology, and all the special subjects. Hospital sections and small ward classes are taken to the bedside or to various special dispensaries, ward-teaching rooms, operating rooms, and mortuary.

The clinical side of obstetrics is taught in the Jefferson Maternity and its dispensary, and in the Wharton-street Dispensary, and regularly scheduled instruction is given in the Jefferson Hospital, Philadelphia General Hospital, the Pennsylvania Hospital, and the Philadelphia Hospital for Contagious Diseases.

Examinations and Promotions.

No student is admitted at any stage to examination unless his class record is satisfactory; students who fail to pass in not more than two subjects can be re-examined before the opening of the next session, and if successful will not lose precedence, but failure in both subjects again will mean removal. Failure in one subject will entail removal of this bad mark by successful examination during the next year, but a student may only carry one such condition into his third year's work, and no conditions are allowed in the fourth year.

HOSPITAL TRAINING.

The *Jefferson Medical College Hospital* is administered by the same board of trustees as the College, and the staff is composed of members of the Faculty and their assistants. By this arrangement all departments of College teaching, including every detail of clinical instruction and laboratory investigation, may be fully correlated. The present hospital was opened in 1907.

The ground floor is devoted exclusively to out-patient services, which also occupy the larger portion of the first floor, in which there are, in addition, administrative offices and reception rooms. The second, third, and fourth floors and part of the eighth, are devoted to ward patients, and, with the private wards, afford accommodation for 377 patients.

The out-patient department is a very large one, the hospital being situated in the centre of the city. The department is so arranged as to afford facilities for the examination and treatment of patients, in which every detail may be followed by students, assigned in sections to the various departments. Under qualified assistants detailed by the professors in charge, students are admitted to wards in which bedside instruction is given. Six operating rooms are especially equipped for section teaching. Under the supervision of professors and instructors, students are required to participate in operations and to assist in the administration of anæsthetics, and are in this way brought into direct contact with the most important details of operative procedures. When the interests of the patient are not thereby jeopardised, the student may follow the case from admission.

VIII.—THE MEDICAL SCHOOL OF JOHNS HOPKINS UNIVERSITY.

Historical.

THE School of Medicine was opened in 1893 as an integral part of the University and in close affiliation with the Johns Hopkins Hospital. The famous letter of Johns Hopkins, in which, exactly 20 years previously, he set out the reason and meaning of probably the largest and most liberal-minded piece of individual charity that has ever been exercised, contains the following paragraph addressed to those whom he selected as the trustees of the movement: "In all your arrangements in relation to this hospital you will bear constantly in mind that it is my wish and purpose that the institution [hospital] shall ultimately form a part of the medical school of that University, for which I have made ample provision by my will."

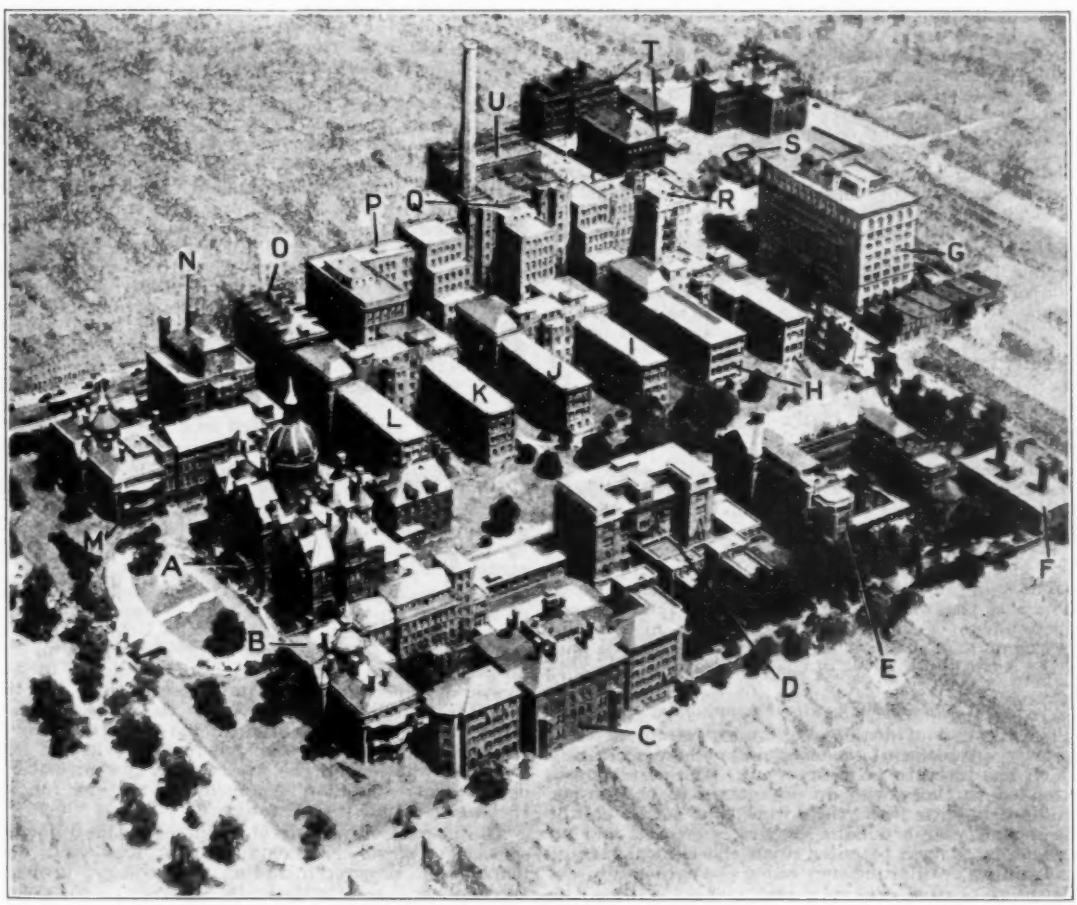
From the opening of the school all the instructors in the underlying scientific branches have devoted their entire time to University duties, while the establishment of the William H. Welch Fund for the advancement of clinical teaching by the General Education Board, some 20 years later, secured a similar basis for the responsible instructors in medicine and surgery and pediatrics. Further endowments have secured similar provision for psychiatry, obstetrics, and ophthalmology. The hospital, which was to be the clinical training ground of the school, was built in 1889; it then had 230 beds and it now has 750. The aerial view shows what it has developed into, and it need hardly be said that it is in the course of making large developments.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

The course of medical instruction extends over four years, and the number of students in each class is limited to 75, only students of real promise being admitted. The requirements for admission are a collegiate degree from an approved source, with certification that the applicant has satisfactorily completed certain minimal tests, those being: one year of college work in biology—comparative anatomy, embryology, or zoology being recognised; two years' work in chemistry—three years' work being advised, and inorganic and organic chemistry having been taken; one year of college work in physics; and a reading knowledge of French and German, with an elementary familiarity with Latin grammar.

FIG. 14.—AERIAL PLAN: JOHNS HOPKINS UNIVERSITY, BALTIMORE.



Key to Illustration of Johns Hopkins University.—A, Administration Building. B, Wilmer Ophthalmological Building. C, Old Nurses' Home. D, Harriet Lane Home (Pediatrics). E, Phipps Psychiatric Clinic. F, Laundry. G, School of Hygiene and Public Health. H, Woman's Clinic (Gynecology and Obstetrics). I, Wards. J, Wards. K, Wards. L, Wards. M, Marburg Building (General Surgery and Medicine, Private Pavilion). N, Kitchen Building. O, Brady Urological Clinic. P, Surgical Building. Q, Dispensary. R, Pathology. S, Site of Welsh Medical Library. T, Medical School. U, Power Plant.

The choice of students is made by taking into consideration the character of the college from which the applicant has graduated, his standing in the subjects, and the opinions given by his science teachers; where possible, a personal interview is obtained. As vacancies occur for any overt reason in the second and third years, students are admitted to advanced standing on proof that they have received the equivalent medical training and are able to pass the examinations of the class to which admission is sought.

Summary of Studies.

The major subjects for the four years of the course are: (1) anatomy (including histology and neurology; (2) physiology; (3) physiological chemistry; (4) pharmacology; (5) pathology (including bacteriology); (6) medicine (including physical diagnosis, neurology and clinical microscopy); (7) surgery; (8) obstetrics (including gynæcology); (9) psychiatry; (10) pediatrics; (11) ophthalmology.

In the present curriculum, as recently planned, the work of the *First Year* is so arranged that the student spends practically all of his time in required courses in anatomy (including histology and neuroanatomy), bacteriology, physiological chemistry, physiology, and pharmacology, with a fair proportion of free time in the last quarter of the year. In the *Second Year* the student is required to take courses in pathology, normal physical diagnosis, diagnostic methods, and clinical microscopy, so scheduled that the fourth quarter of the year is entirely free from any required work. In the *Third Year* instruction for the most part is in small groups, and only a minimal number of hours of instruction for the class as a whole have been set down. Required courses in obstetrics, gynæcology, ophthalmology, medical zoology, and hygiene occupy a small portion of the year, but the major part of the student's work is in medicine, in surgery, and in neurology-psychiatry. Courses in each of these three main divisions of medical instruction are given during each of the quarters of the year; the student may select the quarter in which he takes any of the subjects, thus having required work for three quarters and one quarter entirely free. In the *Fourth Year* a similar arrangement is made, but the student is required to take only one quarter's work in medicine and one in surgery. These two major courses are given each of the quarters of the year, and the student may select the quarter for each of the subjects, though, as in the third year, a limitation of the number of students to be accommodated in any of the courses is necessarily imposed. One-half of the student's time in the fourth year is thus entirely free for courses of his own choosing, for additional work in the required subjects, for investigation, or for migration to other medical institutions.

It will be observed that this is an extremely liberal type of curriculum and well calculated to train practitioners of medicine in the double direction which to-day is the model objective—namely, to become practitioners of medicine along modern methods of treatment and at the same time to take active part in the scientific progress of their profession.

Examinations and Promotion.

The method of dealing with unsuccessful or temporarily unsuccessful students differs here from any which has hitherto been observed. More leniency is extended to those who do not attain to the proper standard in their first year's work, but at the end of the second year a definite barrier is erected and no student is allowed to enter upon the clinical side of his training until proficiency along the earlier subjects has been proved. At the end of the courses the rejections are treated as individual cases, and the students are informed of the particular place in which they have failed to satisfy the requirements of the University, and are advised how to make good their deficiencies. If that cannot be done within a reasonable space of time the school is closed to them.

Hospital Training.

The clinical teaching in the hospital is to a large extent informal, and is conducted for the most part in small sections. During the second year the student is taught, in the hospital, the elements of medical and surgical diagnosis. He is introduced to the technique of history taking, of making a physical examination, and of examining the body fluids and excreta by chemical and microscopical methods. In this work he is also taught the use of the more common instruments for examination, such as ophthalmoscope and laryngoscope. This instruction is almost entirely practical, and makes use of the clinical material, and very little of the time is given to didactic lectures. Thus by the time the student enters the third year he has had an opportunity to become familiar with the technique of the basic examinations essential for diagnosis.

The clinical teaching in the third year in medicine, surgery, and neurology-psychiatry is conducted almost entirely in the out-patient department, although in the case of medicine ward patients are used to a limited extent. In the out-patient department the student participates in the daily routine of the clinic, taking histories and examining patients. In this work he is supervised by an instructor. Whole-class clinics in which diagnostic problems presented by patients seen that day in the clinic complete the morning's work. The afternoons are to a large extent free for elective work, although the students in medicine are required to divide their time between working in the clinical laboratory and examining selected cases on the wards. In the third year all the required work in obstetrics is completed. In addition to the section and whole-class exercises in this subject, each student is required to live for a week in the Women's Clinic, and thus has an opportunity to participate in all the activities on the delivery floor during that time.

In the fourth year the student serves as a clinical clerk on the medical wards and as a surgical dresser on the surgical wards for one quarter each. Upon him devolves the responsibility of taking the history and performing the simpler laboratory examinations of those cases assigned to him. Data obtained by him thus go to form part of the permanent case-records of the hospital. He attends ward rounds which are conducted with small groups as a rule, and has the opportunity to attend whole-class clinics. A few exercises in pediatrics and psychiatry complete the required work of this year. Half of the student's time is left free, to be utilised as he chooses.

The basic idea of the entire curriculum is to teach the fundamentals of the medical sciences in as short a time as possible, to train the student in the elementary technique of examination, and thereafter to give him abundant opportunity to educate himself by participation in the routine work of the departments and by independent study.

The appointments originate in the Medical Faculty of the University. After a man is nominated for a post on the Medical Faculty of the University he is recommended for a part of equivalent rank in the hospital. Thus the professor of medicine in the University becomes the physician-in-chief to the hospital, and upon him devolves the dual responsibility of the teaching in medicine and the care of all the patients and the medical service of the hospital, whether on the wards or in the out-patient department. Similar arrangements obtain for all the services and for all ranks.

The in-patients are divided amongst the following services: *medicine*, including neurology and dermatology; *surgery*, including gynæcology, urology, laryngology, and orthopædic surgery; *obstetrics; pediatrics; psychiatry; ophthalmology.* At the present time some of the subdepartments, notably urology, possess a relatively large number of beds at their disposal. This disproportionate growth is the result of fortuitous grants or bequests and does not represent a studied attempt to exalt the specialties.

The Johns Hopkins Hospital.—This is rather a congeries of hospitals than a single institution. The number of beds is something under 800, but extensive additions are already planned to the blocks of wards lettered I, J, K, L. The hospital contains 11 complete departments with all necessary laboratories. The dispensary deals with over 200,000 visits per annum, the applicants for assistance on the charity side representing some 25 per cent. of the total. Every form of general and special service is here represented.

The medical wards of the Johns Hopkins Hospital, as well as the laboratories for clinical instruction of students, were built almost 40 years ago, which makes them venerable structures in the United States. An entirely new medical clinic has been planned as a complete unit, containing wards, dispensary, laboratories for students, laboratories for routine work and for investigation, and rooms and small amphitheatres for teaching, and one portion of the structure has been completed, including out patient accommodation, various groups of laboratories, and certain teaching rooms. The contemplated additions and modifications are large, and recent constructions show how huge the intended scale is. The dispensary or out-patient department of the medical clinic has been planned so as to divide the patients in a manner which would be analogous in many respects to the medical wards of the hospital. In such relatively small units it was believed that the most efficient service might be rendered to the patient and the most careful work done by the physicians. At a dispensary unit at the Johns Hopkins, therefore, the average number of patients seen varies from 25 to 40 a day; one physician and his assistants are in attendance. Eight students are received for instruction. Each unit is complete in itself and includes waiting space for patients, a consultation room for men, another for women, three examining rooms for men and three for women, a laboratory, a treatment room, a dark room for ophthalmoscopic and laryngoscopic examinations, a room for group teaching of students, a room for secretary, and one room for the nurse and social service worker. There are five such units, and one unit half the size of the others. Three of these are used for general medical cases, one is devoted to syphilis, and one to tuberculosis. The half unit is employed for the special study and treatment of particular groups of patients referred from the other units. It is used on different days for diabetic patients, for the treatment of patients with asthma and hay-fever, or for selected cases of cardiac disease. In addition to these units, which are strictly a part of the medical clinic, there is a unit for neurology and one for dermatology, both of which are nominally subdepartments of medicine. These units occupy four floors of the building, with certain waiting-rooms for fluoroscopic and anthropometric examinations, while the fifth floor is devoted to chemical and physiological laboratories and to offices for the staff. Chemical and physiological laboratories, a biological laboratory, a tuberculosis research laboratory, and a departmental library are also included.

Choosing internal medicine as the branch of study by which to illustrate the methods of instruction, the work is divided into an elementary course, a minor course, and a major course. Each course is approximately of eight weeks' duration. The number of students accepted in any one of these courses is limited. For the elementary course 75 students are accepted, for the minor course 25, and for the major course 20. The elementary course is offered once each year, the minor course three times a year, and the major course four times a year. Any student who has completed satisfactorily the elementary course or an equivalent may apply for admission to the minor course, and any student who has completed satisfactorily the minor course may apply for admission to the major course. This arrangement disregards entirely the fact that the student happens to be in the second, third, or fourth year of the medical school. It gives him the privilege of selecting the time in which he will do his required work in clinical medicine, and places on his shoulders very largely the responsibility for determining the sequence in which he will pursue his studies in the clinical subjects. It also makes it possible to accept special students for these courses in clinical medicine who may come from schools other than the Johns Hopkins, provided their training meets the necessary requirements for admission. The elementary course consists substantially of instruction and practice in the technique of physical examinations which the students must acquire before subjecting the sick to examination, and in history-taking. Later the student is trained in the examination of the blood, urine, and fæces, is instructed in the physical examination of abnormal conditions, and attends conferences and lectures on the interpretation of abnormal physical signs. During the minor course in medicine the student spends his mornings in practical work in the dispensary, attends at noon each day clinics in one or another clinical subject, and divides the afternoons between work in the wards and more advanced work in clinical microscopy.

The students in the major course are assigned to the medical wards as clinical clerks, where their principal object is to observe carefully the symptoms and signs of disease as an active process, and the reactions of human beings to the different disease processes. Each day there are clinics in various subjects, and a feature is made of case demonstrations in the wards. Lastly, the curriculum at Johns Hopkins University is devised to allow the student to follow elective work.

IX.—THE MEDICAL SCHOOL OF NORTHWESTERN UNIVERSITY.

Historical.

THE Northwestern University Medical School was organised as far back as 1859 as the medical department of the Lind University of Chicago, which has now been replaced or merged in the newer institution. This medical school was not only a pioneer in the advancement of medical education in the United States, but was one of the first schools organised in the country as a medical department of an existing university, while it was actually the first American school to enforce a standard of preliminary education. This led to the adoption of longer annual courses of instruction and, in the event, to a graded curriculum in which the studies were assigned in logical order with proper division and association between laboratories and clinical facilities. The medical faculty severed its connexion with Lind to become affiliated with the Northwestern University ten years later, becoming the medical department of that institution. From this time forward the location of the school, which was growing more and more important, changed for various reasons, and in 1905 it became an integral part of the Northwestern University on the Lake Shore Drive, the marine parade of the city, designed to spread indefinitely round the lake (Fig. 15). The magnificent building was given to the University in 1924 by Mrs. Elizabeth Ward in memory of her husband, the late Montgomery Ward.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

In addition to the usual certificates of good character, the requirements are as follows: the candidate must have completed two years of work in an approved college or university, following the completion of a high school course or its equivalent. The two years of college work, calculated as usual by semester hours, will have been employed in studies leading to

degrees in science or medicine, and during those two years the student must have acquired knowledge up to the requisite point, of chemistry, zoology, and physics; of English and of one foreign language, and of other subjects such as economics or history, certain variations in the curriculum being here allowed. That the principles of selection between candidates who can prove their suitability is freely exercised stands out from the figures. 130 new students are taken each year; most or all are already university graduates, and those who gain entrance hardly amount to 10 per cent. of the candidates.

SUMMARY OF STUDIES.

First Year.—The time in the first year is occupied with gross anatomy, histology, and embryology, and with chemistry, organic and inorganic, while the student is introduced to physiology, and receives a certain amount of training in psychology.

Second Year.—The main feature of the work in the second year is the large amount of time occupied in physiology and pathology, both subjects being, as might be supposed, chiefly pursued in the laboratories. A full course in bacteriology is taken in this year, while, together with pharmacology, come the courses in the physiology of digestion and metabolism. By lectures and by laboratory work the student learns the action of common chemical agents as well as the physiological implications of absorption, immunisation, anaphylaxis, and so on. In this year also the student is instructed in the art of physical diagnosis, and begins the study of neurology and psychiatry.

Third Year.—Just as the second year could be regarded as a continuation of, or a correlation with, the first year, so the third and fourth years are definitely linked up with the studies of the preceding period. The main instruction is now given in certain hospitals, and for this purpose the students are admitted to the Cook County Hospital, St. Luke's Hospital, and the Wesley Hospital which, when originally erected in 1901, was adjacent to the medical school. In the third year the student covers what may be called the whole ground of medical practice. In the lecture room, in special clinics, in the wards, or in the laboratories, his time is divided between medicine, surgery, obstetrics and gynæcology, with special stress laid upon neurology, genito-urinary surgery, and pediatrics. The necessary clinical pathology is studied, as well as such special departments as dermatology and oto-laryngology.

Fourth Year.—In the fourth year the medical curriculum is completed by the carrying forward of these studies, with the addition of ophthalmology, orthopædic surgery, medical jurisprudence, and active practice in a lying-in hospital—both in the wards and in the out-patient department. The student also must serve his time as clerk both in the hospital and dispensary. In the fourth year the students, who will by this time number about 120, are taken in groups of 40, and within these groups demonstrations are given by the different teachers to small classes of students, the instruction being given both in the third and fourth years. Groups of six men are assigned to one of the three hospitals for various periods for clinical clerk service, one-third of the class being assigned to the out-patient departments. Small groups of students are given instruction in cardiac pathology and physical therapy, while instruction in contagious diseases is met by the permission to certain students to spend one week of continuous residence in the municipal contagious hospital. In short, the work of the senior year is clinical in character.

FIG. 15.—MONTGOMERY WARD MEMORIAL: MEDICAL AND DENTAL SCHOOLS OF THE NORTHWESTERN UNIVERSITY.

Fifth Year.—A year's work as an interne is required for graduation. The class is divided into three divisions: clinical clerk service, out-patient service, hospital clinics and ward walks. Clinical clerks spend 11 weeks of the senior year in an assigned hospital on the wards and in contact with clinical cases. Each clinical clerk must report a minimum of 20 cases. Each case report will include the history, physical findings, symptomatology, clinical laboratory findings, diagnosis, prognosis, general progress, management, and a brief review of the literature. Senior students on out-patient service report cases from the out-patient department in the same manner as students on clinical clerkships. An outcall service is maintained with the out-patient department. Students on the hospital service may elect special clinics in

the several affiliated hospitals. "Ward walks" are a distinctive feature of this service, a phrase that recalls the fact that, until some 50 years ago, clinical education in Great Britain was always termed "walking the hospitals."

Examinations and Promotions.

The system has been very carefully thought out. At the registrar's office the reports upon the students during their course are received from their teachers, graded upon a system of percentage marks under the letters A to F. The lowest passing grade, C, requires an average throughout of 70 per cent., but though this is the minimum of marks for a pass it will not command promotion, an average of C being needed. If during a single quarter a student does not maintain an average of C, he is warned, and a warning in successive quarters constitutes a "probation." A student placed on probation must maintain for the period specified the average grade imposed by a committee on scholarship, and failure results in refusal of further registration. Below 60 per cent. of marks, indicated by D, earns "a condition" for the student, and a condition in one course earns a warning, and in two courses earns probation. Below 60 per cent. implies failure. A student who receives a failure in one course is automatically placed on probation, while if a condition is not removed before the end of the following quarter a failure is recorded, and this must be removed not later than the beginning of the next school year. Examination in any subject may be imposed by a committee of the school before promotion is granted.

Regular examinations are held at the end of each quarter. Second examinations are set for students who have been absent from regular examinations, or who have failed to receive a passing grade at a regular examination. Students delinquent in two or more branches after re-examination are required to take those branches a second time and may not elect studies that conflict with them. Further re-examination may be obtained by special permission.

HOSPITAL TRAINING.

The students receive their principal training at the Cook County Hospital, St. Luke's Hospital, the Wesley and Lying-in Hospitals, though the resources of other institutions are drawn upon.

The Cook County Hospital.—This institution includes a general hospital, a tuberculosis hospital, children's contagious diseases and psychopathic hospitals, with appropriate dispensaries and pathological department. The number of beds in the Cook Hospital is for the moment about 3600, but enlargement is in course of construction, and the pending alterations affect to some extent the bed capacity of the main structure. The psychopathic hospital has 167 beds, and its duty is to act as a diagnostic clinic, so that the length of residence in this hospital does not average more than six days. The Cook County Hospital provides clinical treatment in its various wards for the medical students also of the universities of Chicago and Illinois. The accompanying plan, drawn from the air, shows the general lay-out.

The hospital requires 15 internes, and over 700 autopsies are performed yearly. These, together with weekly clinico-pathological internes, permit groups of students, duly supervised, to get a close insight into the methods and meaning of diagnosis, while in the general pathological laboratory, the biochemical, the electrocardiac, and basometabolic laboratories, they become acquainted with the developments of modern research. Instruction in all the specialties is given both in large general clinics and to small sections of students, especially in the out-patient department.

Wesley Memorial Hospital is situated in the vicinity, and clinics in medicine and surgery are held here regularly and are attended by junior and senior students. The wards and private rooms contain together 225 beds. The operative clinics are a feature here. The hospital was opened in 1888 "for the gratuitous treatment of the medical and surgical diseases of the sick poor," and, largely owing to the munificence of the Deering family, is a fine example of medical charity.

St. Luke's Hospital.—This hospital contains upwards of 400 beds, of which more than one-quarter accommodate free patients. It is for the reception only of acute curable non-contagious diseases and injuries, and the financial status of free or part-pay patients is investigated. The opportunities afforded are freely used by the students principally in their fourth year, and operative clinics are conducted daily.

The Chicago Lying-in Hospital, in the most thickly populated district of Chicago, has 140 beds. It cares for poor women also in their homes. Every student assists at three or more operations, and resides in rotation during three weeks when he is required to attend six or more deliveries, and to make from 80 to 120 post-partum visits.

The Michael Reese Hospital, having, with the *Sarah Morris Children's Hospital* some 400 beds, is regularly attended by senior students for instruction in pediatrics.

X.—THE MEDICAL SCHOOLS OF THE UNIVERSITY OF CHICAGO.

IN the University of Chicago, founded by the late J. D. Rockefeller, we meet with a pattern of education that is definitely founded upon the intention to regard medicine as a branch of university learning, not to be differentiated, save in its particular bearings, from any university faculty; the training, consequently, is designed to be upon lines analogous with those laid down in other departments of the University. The medical curriculum proper is of five years' duration, the fifth year being the period of internship.

The medical schools of the University include: (1) the Graduate School of Medicine of the Ogden Graduate School of Science; (2) the Rush Medical College; and (3) the Rush Post-Graduate School of Medicine, whose activities are without the scope of these notes.

The following is an announcement of the University and indicates the objectives of the authorities:—

The Graduate School of Medicine of the Ogden Graduate School of Science was organised in 1924. Its purpose is to serve the medical sciences by research and teaching. It is a part of the Ogden Graduate School of Science and its work is done on the University quadrangles in close contact with that of other scientific departments—physics, chemistry, biology, &c. Departments devoted to the pre-clinical sciences were provided for when the University was founded and established shortly thereafter. Their primary purposes are the development of the sciences and the training of scientists. Since 1899 they have included among the courses offered all those required in the first two years of work leading to the degree of Doctor of Medicine as well as those leading to the degrees of Bachelor of Science, Master of Science, and Doctor of Philosophy. With the definite organisation of the Medical School there have been added on the quadrangles clinics and departments devoted to the clinical medical sciences, similarly related to the Ogden Graduate School of Science and with the same general character and purpose. The work of these departments leads to the degrees of Doctor of Medicine, Master of Science, and Doctor of Philosophy. Candidates for the degree of Doctor of Medicine do the work of the first two years in the Graduate School of Medicine in the Ogden Graduate School of Science on the quadrangles of the University.

The work of the third and fourth years may be done either in the Graduate School on the quadrangles

or in Rush Medical College. The requirements for the fifth year may be satisfied either by a year of advanced work in some branch of medical science acceptable to the Faculty of the Graduate School of Medicine, or by a year of successful internship in an approved hospital.

Admission to the Medical Course.

The first- and second-year classes are limited to 100 in each class; the third and fourth-year classes in Rush Medical College are each limited to 140 men. Selection from among the applicants is made on a basis of qualities judged desirable in the pursuit of medicine other than scholarship. Every student must show evidence of satisfactory vaccination.

A Bachelor's degree, equivalent or approximately equivalent to that conferred by leading colleges and universities, is required for admission, and the college work must have included certain semester hours of work in the natural and physical sciences. The applicant must have a reading knowledge of one modern language other than English (German or French preferred); this knowledge is tested by an examination, largely scientific in character. Evidence of interest and ability in research will help applicants.

Certain medical courses are noted for attention, particularly physiological chemistry, quantitative chemical analysis and organic chemistry, embryology, comparative anatomy of vertebrates, pathogenic bacteriology, general bacteriology, and physiology; but it is noted that the study and practice of medicine is so wide a field that no college training can fail to find possible usefulness. The use of the English language, psychology, physical chemistry, advanced biology, advanced mathematics, history, economics, sociology, Latin, Greek, drawing are here suggested. The compulsory subjects are, as they almost must be, chemistry, physics, and biology, but students may prove that they have already studied a medical subject while at college, though this will not shorten for them the medical course proper.

The Ogden School.

Although the pattern is individual—so much so that an authority of the University may be found saying that there is no medical curriculum—the story of student education is similar to that told elsewhere; for pure science must precede applied science, and applied science must precede therapeutics.

In the Ogden Graduate School of Science the student's work may result in his obtaining the degrees of M.D., or D.Sc., or D.Ph. in accordance with varying conditions. The M.D. is awarded on the recommendation of either the Ogden Graduate School or the Medical Faculty of Rush College. The medical degree can be obtained without any collusion with Rush College.

The student, being of age, and having completed satisfactorily four years' medical work in a school approved by the University of Chicago, a certain proportion of which must have been done in the Ogden School, can obtain a four-year certificate, entitling him to serve as an interne for a fifth year and graduate in due course. He must satisfy the authorities of his adequate proficiency in anatomy, physiology, physiological chemistry, and pharmacology; in hygiene, bacteriology, and pathology; in medicine (including therapeutics, pediatrics, dermatology, and neurology); surgery (including orthopædics, ophthalmology, and otolaryngology); in obstetrics and gynæcology.

He must also satisfy *special* requirements of at least one department, and here he may obtain graduation on a Ph.D. thesis as fulfilment of the thesis requirement. He must have passed successfully final examinations in various groups of these subjects, and the examinations may be taken at any time when offered, and no individual course is specifically required for the M.D. degree.

Rush Medical College.

Historical.

At Rush Medical College the clinical medical sciences are acquired by the student in the third and fourth years of his curriculum. This College received a charter by a special act of the State of Illinois in February, 1837. Its founder Daniel Brainerd was its first president. The first course of lectures was delivered in the second story of a frame building on Clark-street, near Randolph, in 1843. In 1844 a college building was erected at the corner of Dearborn-avenue and Indiana-street (now Grand-avenue). In 1867 a larger building was erected on the site of the old one. This edifice was destroyed in the great fire of 1871, and for three years the College occupied a temporary amphitheatre on the ground of the Cook County Hospital, then located elsewhere. In 1875 a clinical building was erected, and in 1893 a laboratory building was erected hard by. The Senn Building, adjoining the clinical building on the east, was erected in 1903. In 1887 the College became the medical department of Lake Forest University, retaining, however, its autonomy. This relation was dissolved by mutual consent in April, 1898, and in the same month affiliation with the University of Chicago was established. In 1883 the Presbyterian Hospital, adjoining the College, was established in affiliation with Rush Medical College. In 1908 an affiliation was entered into with the Children's Memorial Hospital similar to that obtaining with the Presbyterian Hospital. This was transferred in 1919 to the University of Chicago. In 1911 a similar affiliation was entered into with the Home for Destitute Crippled Children, and in 1915 with the Country Home for Convalescent Children.

In May, 1924, a new contract was executed between the Corporation of Rush Medical College and the University of Chicago in accordance with which the affiliation of 1898 was superseded and the University took over the work of Rush Medical College as a department of the University.

Summary of Studies.

The candidate's work before proceeding to clinical studies must have his previous two years' activities duly accredited. That is to say, he must produce time and efficiency certificates with regard to his work in all the usual medical sciences—i.e., anatomy, histology, and embryology; physiology, physiological chemistry, and pharmacology; bacteriology up to a point and the pathology of the laboratory.

The work of the third and fourth years consists mainly of study of the clinical medical sciences: pathology, medicine (including materia medica, therapeutics, and medical jurisprudence), pediatrics, surgery, obstetrics and gynæcology, laryngology and otology, ophthalmology, and dermatology.

Optional courses in addition to those required above are offered to students who desire them, and they are encouraged to spend additional time in special work involving original investigation.

The laboratories at the disposal of the student are numerous, both large and small. The Kent Chemical Laboratory and the Ryerson Physical Laboratory are used for special research; the title of the Hull Biological Laboratories tells their purpose; while new laboratories of physiology, physiological chemistry, and pharmacology have been erected within the last two years. At Rush Medical College the Rawson Clinical Laboratory is placed in a building which houses also a pathological department and a free dispensary, while Senn Hall, erected through the munificence of the late Prof. Senn and other members of the medical faculty, includes a large out-patient department, where much clinical teaching is carried on, conference rooms, and surgical and medical amphitheatres.

Hospital facilities are to some extent in the making as a new hospital and dispensary to be an integral

part of the University structure are imminent. The present University Hospital has 208 beds (Fig. 22, and p. xxxix); the Presbyterian Hospital with 430 beds adjoins Rush Medical College. The students of Chicago University have also access to the wards of the Cook County Hospital and the Chicago Lying-in Hospital.

XI.—THE MEDICAL COLLEGE OF THE UNIVERSITY OF ILLINOIS.

Historical.

THE Medical College of the University of Illinois, including dental and pharmaceutical students, is situated in Chicago, the main University being at Urbana, 130 miles away. The personnel of this large faculty amounts to about 1200 out of a total of some 14,000 students. This College represents the development of what was 50 years ago the College of Physicians and Surgeons of Chicago. This College has been entirely absorbed, but its original buildings remain (though doomed to pass away) as the official block of the school. The medical school, like the rest of the University, is subsidised by the State of Illinois, the modulus accruing to the Medical College being some $400,000.00. The school, which is structurally in a condition of acute development, possesses a hospital of its own of 150 beds, for special purposes of teaching and for research, all the cases being of a charitable nature; while ordinary clinical instruction is provided for the students, as for the three other universities in the City, in the Cook County Hospital, St. Luke's, Augustana, and Michael Reese hospitals.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

For admission to the College of Medicine of the University candidates must present as a minimum four years of accredited high school work, or the equivalent, and two years work in a recognised college or university; the two years of university work comprising as usual the subjects of chemistry, physics, bacteriology, English, and German or French, while certain subjects can be taken voluntarily, such as an ancient language or more advanced mathematics or economics. The

FIG. 16.—THE MEDICAL CENTRE, CHICAGO.

The Medical Centre, Chicago.—The aerial plan shows the Cook County Hospital, where the students of the Chicago and Illinois Universities receive their clinical training, and all the associated institutions, except that for psychiatry and pediatrics, which are situated adjacent to the Main Hospital Building of State Research (see 6 on plan).

University of Illinois.—1, College of Medicine. 2, College of Dentistry. 3, College of Pharmacy. 4, Research Laboratory. 5, Library. 6, Main Hospital Building of State Research and Educational Hospital.

Cook County Hospital.—9, General. 10, Children's. 11, Psychopathic. 12, Morgue. 13, Tuberculosis. 14, Men's. 15, Contagious. 16, West Side Hospital. 17, Illinois Training School for Nurses. 18, Y.M.C.A. (West Side Professional Schools Department). 19, Presbyterian Hospital School for Nurses. 20, Presbyterian Hospital. 21, Rush Medical School. 22, Chicago College of Dentistry. 23, Memorial Institute for Infectious Diseases. 24, Durand Hospital. 25, Loyola Medical College. 26, Frances Willard Hospital. 27, University Hospital.

registered students in the medical curriculum thus have at least a seven-year course, consisting of two years of pre-medical work at Urbana, two years pre-clinical work in the College of Medicine in Chicago, two years of clinical work at one or several of the hospitals, and a further year as an interne in an institution approved by the University. It must always be remembered that the University of Illinois subserves the purposes of the State of Illinois, and some difference is made in respect to the admission of students from without, from whom there is required a scholastic average of at least 10 per cent. above the minimum passing grade.

Summary of Studies.

First Year.—In the first year of the medical course proper the necessary subjects are histology and microscopic anatomy, embryology, regional and systemic anatomy, and gross and microscopic anatomy of the nervous system. A commencement is made also in physiology, bacteriology, and physiological chemistry.

Second Year.—In this year a large amount of time is devoted to physiology and pathology; also to pharmacology, under which heading is included not only materia medica, but general therapeutics, toxicology, physics, and chemistry of the digestive, respiratory, circulatory, and nervous systems. The student is introduced to internal medicine, obstetrics, hygiene, and the fundamental principles of surgery, with instruction, for example, in asepsis, anæsthesia, and surgical dressing, and physical diagnosis.

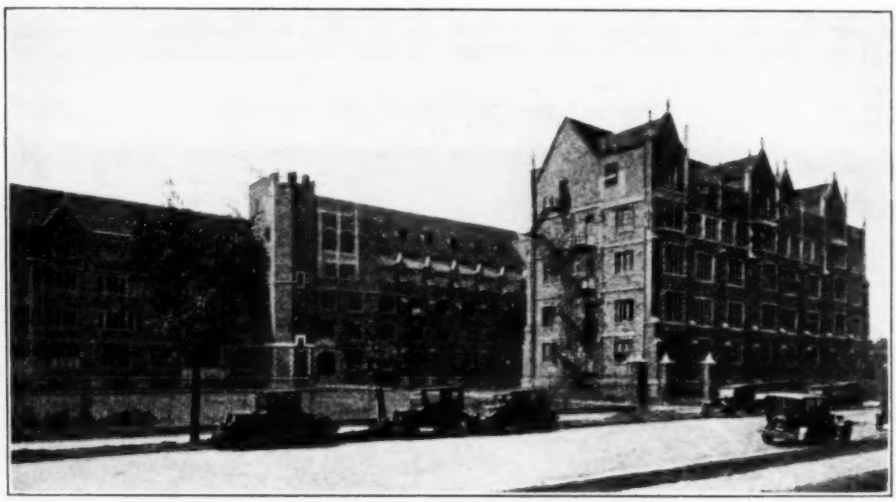
Third Year.—The greater part of the time of the student in the third year is naturally taken up by instruction in the art and science of general surgery and general internal medicine, in the wards of the hospital. Anatomy now becomes topographical, attendance at autopsy is required, instruction in obstetrics is continued, while special attention is paid to such specialties as dermatology, pediatrics, genito-urinary; orthopædic surgery, oto-laryngology, hygiene and jurisprudence also figure in the time-chart, and the length of hours in this year is considerably increased.

Fourth Year.—In the fourth year, while, as before, the greater part of the time is taken up by ward instruction in general medicine and surgery, the other subjects are pursued with various intensity, while the student is invited to take up a large portion of his time in what is termed electives. In other words, he is allowed to indicate the particular subjects to which he proposes to devote special attention.

The clinical instruction, while pursued for particular reasons at different smaller institutions, is largely carried on at the Research and Educational Hospital of the University, at the Cook County Hospital, St. Luke's, Augustana, and Michael Reese hospitals, institutions which provide between them a total of some 5000 beds.

For practical purposes the students admitted all come from the State of Illinois, and the first-year entrance is limited to 130 of those who have satisfactorily fulfilled the necessary tests, other approved students being placed upon a waiting-list. Selection is, no doubt, assisted by the culture of the applicant as indicated in his elective subjects for entrance.

Fig. 17.—University of Illinois.



Research Building, with Educational Hospital in background.

Following the procedure which has already been commented upon in connexion with other universities, a weeding-out takes place, so that at the end of the second year only some 90 to 100 students of the original selection remain, but owing to a liberal though well-scrutinised admission of students of advanced standing, the third year number requiring clinical training is again elevated to 125. These students are divided into groups for teaching purposes and receive instruction on the accepted pattern. That is to say, cases are allotted to them as clinical clerks. Their powers of history-taking, observation, physical diagnosis, laboratory findings, and diagnosis are tested by the professor or associated professor in the subject, and by fellow-students of comparable standing. They defend their judgment as best they can and the teacher uses the situation to give clinical instruction. The same process goes on in the dispensary.

Examinations and Promotions.

The candidate for medical graduation obtains the degree of Bachelor of Science in Medicine by reaching a required grade in three-quarters of the subjects of the curriculum, while of his four years' course one at least must be spent in the University. For the M.D. he must in addition complete a course of 12 months' duration in a hospital affiliated with or approved by the University, though in certain cases a year of research work will be accepted in substitution. Graduation with honours is regulated by the average

success obtained throughout the course, but as early as the second year the student may elect, with the approval of the head of the appropriate department, to pursue a definite line of endeavour, and his success here will count towards his honour degree.

Examinations are held periodically, and a system of marking regulates the procedure for failure. Students who have failed in major subjects undergo re-examination later, or may make good elsewhere if they produce the proof of having done so. Failures in minor subjects can be wiped out by special examinations held immediately preceding the next College term. Further, special examinations are held by arrangement with the Dean and the heads of departments, success at which will improve the candidate's grade in subjects where already average marks had been obtained. The student who fails badly may be required to withdraw, but the arrangements for readmission are fair and well thought out.

Hospital Training.

This takes place principally in the Cook County, the Michael Reese, the St. Luke's, and Augustana hospitals, of which institutions the first three have already been noted (see p. xxv), and, of course, at the Research and Educational Hospital of the University. The Augustana hospital is a general hospital of about 220 beds.

The Research and Educational Hospital.—In association with the Department of Public Welfare of the State of Illinois a group of hospitals and laboratories has recently been opened, affording the University adequate facilities for teaching and investigation. The buildings occupy a campus approximately eight acres in extent, located immediately adjacent to the Cook County Hospital. The units now in operation include the following: out-patient dispensary, general hospital, research laboratory and library, pediatric ward, and the orthopædic and psychiatric divisions. The hospital has been designed to afford comfort for the patient, and the use of the clinical material. At the present time some 200 beds are occupied, but a total of 450 is contemplated for the main building (Fig. 17).

The *first* floor of the hospital proper contains the pediatric, the obstetrical, and the rontgenological departments. The *second* floor of the hospital, in addition to wards, contains the clinical laboratories, with divisions for bacteriology, serology, pathology, biochemistry, and metabolism. The *third* floor comprises eight suites of operating rooms and their necessary service rooms, with special operating rooms for head and genito-urinary work. The *fourth* and *fifth* floors contain living rooms for internes and residents and the quarters for the managing officer of the institution.

An out-patient dispensary occupies the main floor of the hospital building. It possesses large waiting-rooms, suites for all divisions of clinical work, a large amphitheatre, drug dispensary, and preparation rooms (used in conjunction with the School of Pharmacy), electrocardiographic and hydrotherapeutic units being located in the basement of the building. In addition the administrative and service offices are located on this floor. Joining the hospital by corridors leading from the basement and the third floor the University has erected a laboratory building for the science group of the medical school. Here the basement houses the photographic and plastic divisions of the illustration studios. The Department of Pharmacology occupies the first floor, Department of Bacteriology and Pathology the second floor, and the third is used by the Department of Physiology and Physiological Chemistry. The Department of Anatomy occupies the major part of the fourth floor, and the entire fifth floor is given over to the Animal Hospital, Animal Surgery, and kennels for dogs and smaller animals.

We may take the Department of Internal Medicine by which to illustrate the student's course. The work in this department, although begun in the second year, is of course mainly done in the third and fourth years. In the second year, however, the whole class of 130 is divided into small groups, so that instruction is individual, and coincident with this course the student works at laboratory diagnosis. Thus he is ready for practical clinical work in the out-patient department in the third year, when in addition to attending lectures he has the opportunity to be present at conferences and clinics. Special emphasis is now laid upon clinical work, small groups at bedside clinics being given to not more than eight students simultaneously brings about close relations between him and the instructor on the one hand and the patient on the other. Physical diagnosis will be mainly inculcated in the second year, while the work in the third year will be done in the various wards and along selected lines in the Cook County Hospital and in the Research Hospital of the University. In the fourth year, while this clinical instruction is being generally carried to a higher point, in addition to a review course of principles, optional courses in the regional medicine of the heart and chest, in diseases of the blood and blood chemistry, and in clinical parasitology are provided.

Particular emphasis is placed upon the work of the fifth year. Students are distributed among various hospitals of the country, which have been recognised by the Council on Medical Education of the American Medical Association. This work is not done directly under the supervision of the Faculty, though at several hospitals where the majority of our students take the intern year, many of our professors serve on the staff. Written reports are received monthly from reliable persons in the various hospitals concerning the progress of the work of the students. By this system the county hospitals become interested in medical education, also the students feel that during this period they are still, at least to some degree, within the influence of the University.

XII.—THE MEDICAL SCHOOL OF THE UNIVERSITY OF MICHIGAN: ANN ARBOR.

Historical.

In the University of Michigan the medical school was the first school to be established, the actual organisation being planned in 1837, and the school opened in 1850. The University may therefore be said to have developed round the school and hospital, while the latter was represented 60 years ago by a transformed dwelling-house, containing 20 beds, provided to meet the needs of a small rural community. The romantic name Ann Arbor is derived from the fact that in the immediate vicinity of this early hospital there once stood an arbor in which two ladies, each named Ann, wives of local land-owners, were wont to entertain their friends while their husbands were among the early founders of the city.

The medical curriculum expanded together with the hospital accommodation, and what had been merely a course of lectures became a scheme of education under which, first, a year's clinical experience with a practitioner was demanded, and then, in rapid succession, compliance was necessary to a curriculum of two, three, and four years. This curriculum since 1890 has undergone the development entailed by the progress of medical science, resulting in sequence and concentration in the subjects presented, abundant laboratory teaching, and frequent survey in lectures and clinics of all that is taught.

The Medical Curriculum.

Matriculation and Requirements for Admission.

The applicant for admission to the medical school must present evidence that he has completed at least two years' work, calculated in semester hours,

in a recognised college or university, following upon a course at an approved high school. In the high school course Latin is a compulsory subject, while the pre-medical study in the University comprises, together with chemistry, physics and biology, instruction in English literature and composition, and familiarity with either French or German acquired by two years' study. A State board of registration in Michigan requies the submission to it of the credentials relating to the pre-medical study. Students may be enrolled on desiring to take a degree both in art and medicine, when a combined though rather longer course will lead to the double graduation.

FIG. 18.—THE UNIVERSITY HOSPITAL, ANN ARBOR.

The number of students applying for admission at Ann Arbor is very high; as many as 1000 may apply, although it is not possible to admit more than a fraction of that number in a given year. In the course of the four years of the medical course proper the number dwindles through the falling away from the standard, but the care taken in selecting the students from among the mass of applicants is indicated in the fact that, whereas such casualties formerly amounted to as many as 15 per cent., to-day the figure is only 8 per cent. Every applicant is seen personally by the Dean, and no differentiation is made between the sexes.

SUMMARY OF STUDIES.

The clinical work is done at the University Hospital and the pre-clinical at the school, where the pre-clinical departments occupy three buildings, one of which provides ample accommodation for the study of anatomy, physiology, and bacteriology; another houses the laboratories of pathology, physiological chemistry, and hygiene; while the third is given up to pharmacology and animal research.

The medical curriculum covers four college years of nine months each. The first two years are devoted to the more strictly scientific work, which serves as a basis for the technical and clinical studies which follow. Stress is laid on laboratory instruction in anatomy, histology, embryology, physiology, physiological chemistry, hygiene, bacteriology and pharmacology, and in the clinical laboratories. The same objective method of teaching is carried into the clinical work. During the first year the greater part of the day is spent in the laboratory; during the remaining years the mornings are devoted mainly to lectures and recitations, and the afternoons to laboratory drills, the study of methods of diagnosis, and means of treatment and clinical work.

First Year.—The subjects are, primarily, histology, embryology, and anatomy, developed into the anatomy of the nervous system and regional anatomy. Later in the year the subjects are physiology and physiological chemistry and bacteriology, all the subjects being presented in lectures, but worked at in the dissecting rooms and laboratory.

Second Year.—In the second year, in which the same subjects are taken up, there is a definite shaping of studies toward medical application. Anatomy is taught from the functional and surgical sides, time is given to clinical microscopy and physiological chemistry, and the study of drugs is commenced, the connexion with animal experimentation being displayed. Thus the student approaches pathology, while he is also helped to appreciate his approaching work in the wards by courses in physical diagnosis.

Third Year.—In the third year the practice of medicine in the wards and out-patient department is in full swing, the clinical work being done in the hospital of the University. Alongside of this training in the principles of surgery, medicine, and obstetrics, instruction is given by lectures and clinics in preventive medicine and in various specialties, such as pediatrics, ophthalmology, psychiatry, and neurology, otolaryngology, and neural pathology.

Fourth Year.—The work is a development of that of the preceding year, but regular attendance at autopsies is required. The class is divided into sections, according as the particular study is in medi-

cine and surgery generally, in obstetrics and gynæcology, psychiatry and neurology, dermatology, pediatrics, ophthalmology, and oto-laryngology, a system of rotation securing a complete range of studies for all.

The course outlined leads to medical graduation, but at Ann Arbor there are combined curricula in science and medicine (B.S., M.D.), in literature and medicine (A.B., M.D.), and in pharmacy and medicine (B.S. (Pharm.), M.D.); for these combinations there are special regulations.

Examinations and Promotions.

Examinations are held in all subjects at set times. Students may be reported as having passed the course with a grade of A = Excellent, B = Good, C = Passed; or they may be marked D = Conditioned, E = Not Passed, and F = Incomplete or Absent. Students receiving a D grade are allowed one supplemental examination to remove the condition. Failure to remove the condition results in the course being reported "Not Passed." Subjects reported as "Not Passed" (E) must be taken over before the student is eligible to another examination in the same course. Courses reported as "Incomplete" or "Conditioned" (D), and not cleared within one year, become "Not Passed." During the first and second years in the medical school any student receiving two or more conditions or "not passes" in any one semester, and failing to justify the failure, will be removed from registration. During the third and fourth years the same rule applies, except that three or more "not passes" are allowed.

Lastly, no student can graduate until all his required work is complete, his conditions removed, and his examinations passed, but re-examination is allowed on fair terms and for satisfactory reasons. The curriculum is closed by a comprehensive examination which acts as a sort of sieve through which only the approved material can pass, while a fifth year is added to the course for the State licence, the time being spent as an interne.

HOSPITAL TRAINING.

The University Hospital has over 1100 beds; the hospital is owned by the University of the State, and it is understood that in consideration of their treatment the patients will be the subjects for clinical instruction. The teaching of medical students is announced in the official publication regarding the hospital as the primary object of this institution.

The hospital is placed on high ground overlooking the Huron Valley, and the main building, which has only recently been opened, offers every modern advantage of plan and equipment. The general plan, that of a double connected Y, on six storeys, provides for light wards and clinical laboratories in profusion; the first floor level is given over to a diagnostic department, where the various members of the medical staff have their examining rooms with teaching facilities supplied, and where the dispensary is placed. This out-patient department is a large one, for though Ann Arbor is a small town, it is in the immediate vicinity of Detroit—an immense and growing place. Patients are admitted to the diagnostic unit, and then from one medical service to another, until a complete diagnosis is made by the staff working as a group. A rear wing of the building houses the department of clinical pathology, the X ray rooms, and operating theatres, while a front wing is occupied by the administration.

A State Psychopathic Hospital is in close vicinity, as are buildings for tuberculous and infectious patients, and a convalescent hospital. In all these institutions, as in the main buildings, the clinical education of the student is carried on, with small rotating classes, by means of bedside instruction and conference.

MEDICAL EDUCATION IN CANADA.

I.—THE MEDICAL SCHOOL OF McGILL UNIVERSITY.

Historical.

UNDER the will of James McGill the Royal Institution for the Advancement of Learning came into existence 110 years ago, and three years later a Royal Charter was granted to the institution for the founding of McGill College, while the corner-stone of the Montreal General Hospital was laid. The interconnexion between the academic teaching of the university and the clinical teaching of the hospital was recognised from the beginning; and exactly 97 years ago the Montreal Medical Institution, that being the medical school of the hospital, was engrafted upon the new McGill University as its medical faculty. Throughout the following century during which the science and practice of medicine, as we now know them, have grown up, the Faculty of Medicine in McGill University has been a progressive and distinguished one and its graduates have been found among the advanced scientific thinkers and workers of the day.

THE MEDICAL CURRICULUM.

Matriculation and Requirements for Admission.

The medical graduate is required to take a seven years' course, two of these being pre-medical and five being directly concerned with his professional training. The candidate for admission to the first year of the curriculum must therefore prove that he has already completed two full years in some college or institution for the study of arts and science satisfactory to the University authorities, during which period he will have obtained instruction in physics, biology, and chemistry, while at the same time stress is laid upon the necessity for adequate knowledge of the humanities. Wisely, however, the authorities at McGill allow themselves a certain amount of latitude in the interpretation of their own statutes, so that they are not compelled to reject an obviously suitable candidate because in one of these subjects he may be weak. Proved accomplishment in other directions is allowed to counter-balance the temporary defect which in these promising students has always disappeared during the first month or two of professional training. That the high standard thus enjoined before admission to the first year of the faculty is fully justified at McGill is proved by the fact that over 80 per cent. of these intending adherents are already university graduates, while probably less than 20 per cent. of the applicants obtain admission. The graduates and admitted students come virtually from all parts of the world.

SUMMARY OF STUDIES.

The first year is occupied with anatomy, histology, bacteriology, physiology, and biochemistry. The next period, one of two years, is devoted to general pathology, such subjects as pharmacology and medical jurisprudence being also included. The final two years are occupied with the clinical application of this professional training—namely, in medicine, surgery, obstetrics, gynæcology, and preventive medicine. In order to qualify for the examinations at the end of each of these divisions the candidate must, of course, prove his diligence in the usual manner; he must pass in the subjects included in the first division before he can begin the work of his seventh term (that is the work in the third division); and he must pass his examination in the second division before he can proceed to the work of his tenth term, that is to say, the hospital study of medicine and surgery. In the closing examination

the subject of public health can be taken separately, but the examinations in medicine, surgery, and obstetrics must all be passed at one time, subject to certain leniency at the discretion of the medical faculty.

Examinations and Promotion.

Class examinations, oral or written, are held during the session to test the progress of the student. If the standing obtained by any student in these examinations is unsatisfactory, he is not permitted to take the *Final and University Examinations*. These are the ultimate test in determining a student's fitness for promotion or graduation, and cover the following subjects arranged in three divisions:—

First: (1) anatomy, (2) histology, (3) bacteriology, (4) physiology, and (5) biochemistry.

Secondly: (6) pharmacology, and (7) pathology and medical jurisprudence.

Thirdly: (8) public health and preventive medicine, (9) obstetrics and gynæcology, (10) surgery (including urology and orthopædic surgery), and (11) medicine (including pediatrics, neurology, psychiatry, dermatology, and laboratory diagnosis).

A student who has failed in the *Final Examinations* in any subject may apply for re-examination at the next examination period, and at the conclusion of each course he is graded in one of five groups: A (honours), B (good), C (fair), D (doubtful), and E (failure). The grade assigned to a student is based upon the tests but the record of the work done throughout the courses is taken into account and the quality of the English used by the candidate helps in determining his standing always. The rules for promotion following these tests have been summarised already, but in respect of the third or last division of the University examinations it should be noted that to qualify here in medicine, surgery, and obstetrics a candidate must have: (*a*) Attended courses extending over a period of not less than 15 terms. (*b*) Satisfactorily completed the prescribed courses of study and practice in: (1) ophthalmology, (2) oto-laryngology, (3) abnormal psychology and psychiatry, (4) infectious diseases, (5) anæsthesia, and (6) post-mortem examinations.

As has been said above, the completing tests in medicine, surgery, and obstetrics must all be passed at one time, but a student who fails in one of these subjects only may, at the discretion of the faculty, be allowed a re-examination in that subject at the next regular examination period, provided that he shall have satisfactorily completed such additional work as may be prescribed by the head of the department concerned. But the faculty reserves the right to require the withdrawal of any student at any time if, in the opinion of his instructors, he is incompetent. a promotion committee considering the cases of all students who at the conclusion of their third term are reported by their instructors as having fallen below the grade of C, in order to determine whether such students are to be allowed to continue, warned, required to repeat the course or courses, or retired from the school.

HOSPITAL TRAINING.

During the last two years the professional training is pursued in the wards mainly of the two great hospitals of Montreal, the Royal Victoria Hospital, and the Montreal General (Central Division). These two hospitals are institutions of which any city in the Empire might well be proud.

ROYAL VICTORIA HOSPITAL, MONTREAL.

The Royal Victoria Hospital of Montreal stands on a site of extraordinary beauty, and fits into its grand environment both in style and design of building, while remaining a model of practical efficiency—the beauty is there but no possible feature of utility has been sacrificed to the picturesque. The hospital is now 35 years old and owes its origin to two great and generous Canadian statesmen, Lord Strathcona and Lord Mount-Stephen, who decided jointly to build and equip an institution worthy of the future needs and importance of Montreal. This ambition was realised within one year of the project being decided upon, and in 1894 the Royal Victoria Hospital opened with 250 beds. It has now 700 beds, and the history is one of steady progression, of addition to the buildings and extension of the activities. Within 12 years the increasing demands upon the hospital's accommodation made it necessary to erect a fitting nurses' residence, while the original nurses' quarters were transformed into wards or laboratories. As with each year the pressure on the hospitals' capacity increased, new constructions were designed in keeping with the original building, and in 1916 the Ross Memorial Pavilion, containing six floors with accommodation for 120 patients, was added. This block was erected and equipped through the bounty of Mr. J. K. L. Ross, one of the hospital's governors, and is dedicated to the memory of his parents. The pavilion possesses its own operating suite, X ray, cardiograph, and physiotherapy departments. Upon its equipment no pains, either practical or æsthetic, have been spared, while in its kitchens all the cooking

FIG. 19.—ROYAL VICTORIA HOSPITAL, MONTREAL: MAIN BUILDING.

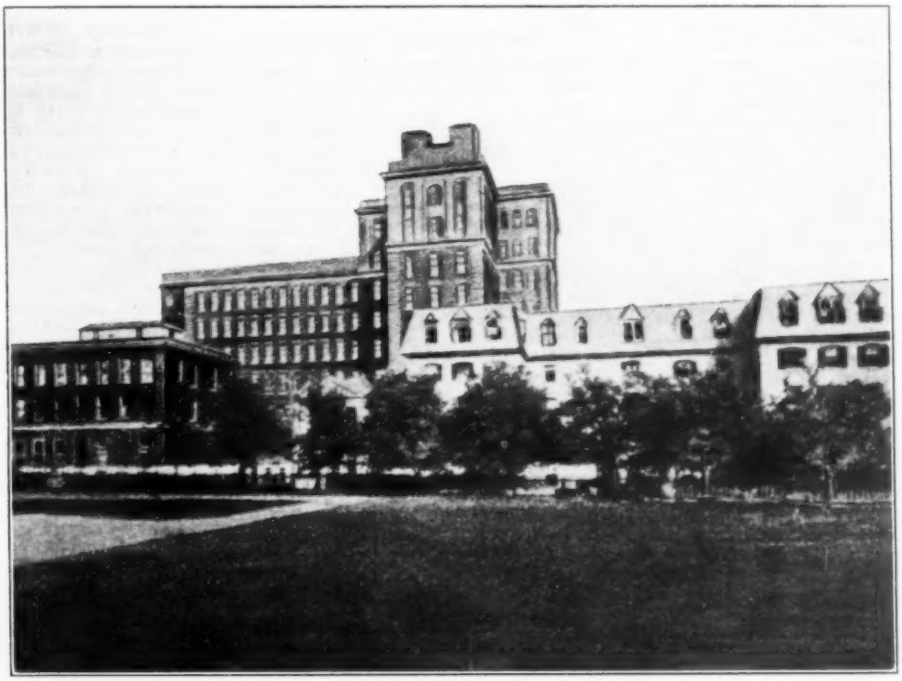
is done by the nurses as part of their training. The pavilion was opened 12 years ago by the Duke and Duchess of Connaught. In 1925 the hospital assumed control of the Montreal Maternity Hospital, which meant an addition of 75 beds to the central institution, and implied a very wise recognition of the prime importance not only to the community but to the medical students of a thorough training in obstetrics and gynæcology. The construction and equipment of this building were conceived after an inspection, undertaken by the officers of the institution, of the latest and best in similar hospitals in Europe and the United States, and the new building, which stands in the grounds of the main buildings, was opened in 1926 by Lord and Lady Byng. It constitutes a complete unit of nine floors, contains its own kitchens, stalls, operating-rooms, X ray department, and other necessary annexes. The two topmost floors provide accommodation for the nurses, and the patients' beds now number 212.

Montreal General Hospital.

The Montreal General Hospital is the senior institution, as may be shown by the fact that in 1927 it published its 106th annual report. It was founded rather as a dispensary with an infirmary attached, but a picture of the original buildings shows that by 1848 it had definitely assumed the character of a small general hospital. As a brief way of describing the progress of the institution this picture tells the story. The right hand lower portion is the original building as it was built in 1848 with certain structural alterations, while to the left stand the old medical buildings, and behind the great pathological building erected some ten years ago. Fronting the hospital is now an imposing building, completed two years ago as a residence and school for nurses, but like the Royal Victoria Hospital, Montreal General Hospital intends to progress, and judging by the plans for the future the progression implies the disappearance of the 1848 building and the completion of the pathological block by the addition of a central administrative department and of an entirely new wing to the right of the central erection. It is clear from the last annual report of the general superintendent that further extensions are contemplated, as forcible reference is made to the shortage of hospital beds felt from day to day in the city of Montreal.

The Western Division of the Montreal General Hospital, known as the Western General Hospital, is used for the treatment of acute diseases. It has 62 public beds and the post-mortem and surgical material is now being used for teaching, in which direction additional opportunities are contemplated.

Fig. 20.—Montreal General Hospital.



The Hospitals of the Montreal Hospital Council.

While most of the clinical education of the medical students of McGill University is conducted at these two great hospitals, the Montreal Hospital Council, an association of the hospitals of the city of Montreal has under its superintendence 17 other hospitals, general or special in character, varying in bed capacity, and varying also in form of organisation. The following is the full list, and at those marked with an asterisk the medical students, in the closing stages of the curriculum, may obtain instruction.

**Alexandra Hospital.*—175 beds for the reception of contagious diseases. The students here receive instruction in the diagnosis and treatment of exanthemata.

Catherine Booth Mothers' Hospital.—50 beds. Under the charge of the Salvation Army.

**Children's Memorial Hospital.*—130 beds, with a large out-patient attendance. Primarily designed for the orthopædic cases, it now admits all varieties of patients giving the student a broad conception of pediatrics.

Homœopathic Hospital of Montreal.—50 beds.

Hôpital Français.—150 beds. General University. Semi-open.

Hôpital du Sacre-Cœur.—1500 beds. Care of incurables and of tuberculous patients.

**Hôpital Saint-Jean-de-Dieu.*—This hospital with 3300 beds is affiliated to the University of Montreal and provides a complete course of training with a special course of psychiatry. The institution has a contract with the Government of Quebec for the care of insane patients.

Hôpital Ste. Justine.—This is a private hospital with 165 beds, although it is designed to double its capacity. It is entirely a private corporation.

Hôtel-Dieu de St. Joseph de Montreal.—300 beds. General hospital.

La Misericorde Hospital.—This large hospital contains 600 beds, and although the services are of a general capacity, it is mainly devoted to the study of obstetrics and pediatrics.

L'Hôpital Notre Dame.—300 beds. Provides general services.

Montreal Children's Hospital.—Contains 50 beds, but an extension under which four times as many patients will be accommodated is under contemplation. The outdoor clinic here is exceptionally large.

**Montreal Foundling and Baby Hospital* has a capacity of 80 beds, and is designed to take care of sick and destitute children for the first two years of life. A large amount of clinical material is here provided, special consideration is given to the problem of infant feeding. Connected with the institution is a largely attended baby welfare clinic.

Shriners' Hospital for Crippled Children.—50 beds, the staff devoting special attention to orthopædics.

St. Mary's Hospital.—50 beds. The hospital is in the charge of nursing sisters, but professional matters are controlled by a medical board. This is a small general hospital.

The Women's General Hospital.—150 beds (help).

**Verdun Protestant Hospital* affords opportunity for the study of psychiatric patients. It has 630 beds and the students are conducted about the wards in groups, and are required to report on cases and to discuss the general problem of psychiatry and occupational therapy with their teachers.

THE UNIVERSITY AND THE HOSPITALS.

The association between the University and the affiliated hospitals is very close; indeed, it may be called complete, the university professors and teachers comprising the staffs of the hospitals, while in the election to those staffs the University has a predominant vote. The trustees of the hospitals, in the interest of donors and subscribers, as well as the province and city, have voices in the elections, but for practical purposes the University controls the issue. The Royal Victoria Hospital is adjacent to the medical school, and is completely equipped, as a general hospital, with all special departments; with the Montreal General Hospital the total of public beds provided for clinical study is some 700, while the beds in the affiliated institutions bring the full total up to about 2000.

II.—THE MEDICAL SCHOOL OF THE UNIVERSITY OF TORONTO.

Historical.

THE University of Toronto dates from 1827, while the absorption of Trinity College, which had formerly possessed a medical faculty, dates from 1903. The medical faculty in its present form, and as an integral part of the University, dates from 1887; and, while the magnificent buildings that have now been erected in Queen's Park typify the growth and expansion of the University, they may also be taken to represent the progressive importance of the medical faculty.

THE MEDICAL CURRICULUM.

Matriculation and Requirements on Admission.

The Faculty of Medicine in the University of Toronto provides for a six years' course, but here the division varies from that at McGill, where there are two pre-medical and five professional, by having one year for honour matriculation, one year for pre-medical, and five years professional. The candidates for admission to the first year in the Faculty of Medicine must present pass matriculation certificates from the Department of Education of the Province of Ontario, showing proficiency in Latin, English, history, mathematics, a language, and experimental science, that is physics and chemistry; honour matriculation implies a choice of Latin, Greek, or a modern language, and one of the sciences. The faculty reserve a good deal of liberty in the substitution of subjects, the intention being merely to make sure that in addition to a knowledge of physics and chemistry up to a pass standard, the general education of the candidate is high enough to enable him to appreciate instruction in the immediate professional subjects. Candidates from the British Isles are admitted on the certificate of registration as a medical student with the General Medical Council of Great Britain, while those who possess a degree in arts from any recognised university also enter without question. Here, as at McGill University, although there is a generous appeal to other than local students, only a few non-residents can be accepted out of some 400 annual applicants, as those from the Province of Ontario are given preference in making up the entering class of about 120 students. There is reasonable flexibility in obtaining an equivalent standing by communicating to the Registrar of the University official statements of previous work.

SUMMARY OF STUDIES.

The medical curriculum has been designed to furnish a framework of knowledge and technical skill which will adequately equip all students for the general practice of medicine and its branches, and this is kept steadily in view throughout the whole six years, the regular work being amplified with special studies designed to broaden general education. Hence optional courses are available in the six years' curriculum, and are either of a scientific or a "cultural" character in the early part of the course.

During the *first year* biology, physics, and chemistry; during the *second year*, anatomy and physiology, histology and embryology precede the studies of the *third year* where the same subjects are developed, the anatomy of the central nervous system being especially studied, while bacteriology and elementary pathology and biochemistry are taken. The importance of the latter is recognised by three lectures a week throughout the year, laboratory courses in the Michaelmas and Easter term, and tutorial assistance one hour weekly, reviewing and supplementing the main work of the laboratory. At the end of each of these three years there is an examination, and the student cannot proceed to the study of the subjects in the following year until he has been successful in the preceding one, but there are supplemental courses to meet the case of "referred" candidates—that is to say, that a student failing, say, in one of the first-year subjects can use his long vacation by taking a supplemental course which will enable him if successful to pass on to the second year.

The *fourth year* is a critical one. The study of pathology is undertaken in academic manner, while clinical work in the wards in medicine and surgery commences. The student now receives a general introduction to pathology as applicable both to medicine and surgery, while he becomes familiar with the process of taking histories, and is instructed in the recognition of physical signs. This, therefore, is a very important year in the course, for if the student fails badly he may have several subjects in which he is required to make good in the supplementary classes. This may result in the loss of a year's study, while there is a system by which persistent failures may make continuance of the curriculum impossible. These considerations hold good in the case of the unsuccessful student also in the two last years.

In the *fifth year* the hospital instruction is in full fling, and while there is a marked difference between the procedure in the two clinical years of the British schools and those of Toronto University, the result will come out much the same. The student does not "dress" or "clerk" for a particular member of the staff, but for periods of ten weeks he receives clinical instruction from different teachers, while what is termed "theatre teaching" proceeds in clinics, and the classes are divided into small groups for clinical instruction in the wards. Bedside clinics on different types of diseases are given weekly, while the students are engaged in taking histories, examining patients, and carrying out the clinical laboratory investigation of their patients, and a weekly clinic is held in the hospital amphitheatre, at which cases are present illustrating different types of diseases. In addition to medicine, surgery, obstetrics, and therapeutics generally the specialties of pediatrics, hygiene, toxicology,

and pathological chemistry are introduced, and attendance is required at 12 autopsies. Students who have completed the work of the fifth year are also required, before commencing the studies of the sixth year, to undertake field work in public health and preventive medicine.

In the *sixth* or final year the students are placed in three groups—medicine, surgery, and specialties—and the time is divided thus: For a period of ten weeks each group devotes its whole time to clinical medicine with a similar period to clinical surgery; for five weeks to obstetrics and gynæcology; five weeks to special subjects. In this year the students have patients in the ward allotted to them, and the clinical teaching suggested by these cases is provided by the staff each morning.

The Medical Building is three storeys in height in front, with an additional storey and sub-basement in the wings, which extend eastward. Two large lecture rooms are provided which flank the main edifice; the larger has accommodation for about 350 students; the smaller for about 200 students. The three main floors are arranged on the unit system, a unit room being 30 ft. long by 23 ft. deep, lighted on its long face by large windows. These rooms may be united so as to form large laboratories or may be cut in two where it is necessary. The Building is utilised for conducting the work in the departments of physiology, biochemistry, pharmacology, and zymology. In it are also the administrative offices of the Faculty of Medicine.

The Pathological Building is connected by a covered corridor with the out-patient department and so with the rest of the hospital. On the basement are the pathological museum, lecture room, and autopsy room; on the first floor rooms for the routine pathology, class-rooms for pathological histology and bacteriology, and the Department of Medical Research. On the second floor there are laboratories and rooms for the departmental library and special classes in pathology, in addition to laboratories for bacteriological and serological investigation. On the third floor are the class-rooms for systematic instruction in pathological chemistry and the laboratories for the staff in this department, including balance, polarimeter, combustion, and experimental rooms. Above this is the accommodation for animals.

Connected with the autopsy room is a cold storage plant with accommodation for 12 cadavers, and by means of a brine circulation, refrigerators in the staff laboratories on the first, second, and third floors are kept cold. For many of the laboratories, too, there is a compressed air service.

The Anatomical Building consists of four storeys and a basement except at the north end, where there is a large lecture room, two storeys in height and capable of accommodating 250 students. Beneath the lecture room are several well-lighted and commodious rooms which are equipped as a laboratory for experimental surgery. The remainder of the basement gives ample space for the preservation and storage of material and for workshop. On the first floor are a chart room and a photographic room, and two study rooms. On the second floor is a commodious museum occupying the south end of the building, with a preparation room in connexion. Two laboratories planned to accommodate classes in histology, embryology, and neurology are also provided upon this floor, together with a second lecture room with seating accommodation for 100 students, and two demonstration rooms. On the third floor are a library, private rooms for the staff, a dissecting room, and a room for X ray demonstration. Another dissecting room is on the floor above.

FIG. 21.—TORONTO GENERAL HOSPITAL.

View of grounds—public wards.

HOSPITAL TRAINING.

The greater part of the student's course is provided by the Toronto General Hospital, supplemented by attendance at the Hospital for Sick Children, St. Michael's Hospital, the Toronto Western Hospital, the Psychiatric Hospital, and the Riverdale Isolation Hospital.

Toronto General Hospital.—The hospital has 750 beds, and during the last year admitted to its wards 11,941 patients. The outdoor department, which has been elaborately equipped with especial attention to the requirements of teaching as well as treatment, is designed to receive and care for several hundred

patients each day, if necessity demands. Last year 67,358 out-patients were treated. The hospital is for the treatment of acute medical and surgical diseases, and the members of the staff are, in nearly every instance, drawn from the University medical faculty.

The hospital block contains ten acres, and the group of buildings includes almost everything necessary to enable a student to acquire a practical knowledge of the profession of medicine. On the south-west corner is situated the large pathological building, which is also an integral part of the hospital. In it are found the pathological, clinical, and chemico-pathological laboratories, as well as the autopsy room and the museums. The Pathological Building is regarded as one of the most complete in America. There were 304 autopsies during the year. North of the pathological unit is found the out-patients' department already referred to; then follows the emergency hospital, fully equipped with every modern device necessary for the immediate care and treatment of emergency patients. In this building arrangements have been made for the teaching and demonstration of practical methods in minor surgery.

The medical wing, the administrative building, and surgical wing embody every modern requirement in hospital equipment, and special facilities for the student are provided. Twelve operating rooms are to be found in the different surgical sections. South of the surgical wing is located the obstetrical hospital with 80 beds. The number of births in this department last year was 1332. To the X ray department more than 100 patients a day are sent in for examination, and complete courses are given to the students in X ray work. A well-equipped hydrotherapeutic department is connected.

Hospital for Sick Children.—This hospital, with 262 beds, has been remodelled and a large new wing has been built on the west side of the present building. These alterations and additions include new operating theatres, out-patient department, pathological laboratories, and wards for infectious cases.

St. Michael's Hospital.—This is a general hospital where medical, surgical, and obstetrical cases are admitted. The number of patients admitted last year was 4710, while 40,282 cases were treated in the out-patient department. There were 462 births in the obstetrical department. The accommodation has been enlarged by the addition of a new wing, so that there are now 383 beds.

Toronto Western Hospital affords excellent opportunities for clinical study. There is an outdoor service where dental, tubercular, surgical, medical, gynæcological, and special clinics are held. Two large operating theatres are provided and there are four public wards for clinical teaching.

The *Toronto Psychiatric Hospital* receives mental and nervous patients from the City of Toronto, especially milder types, for short periods of observation and treatment, and determines the best method of disposal of other cases which may not be suitable for admission to the hospital. Persons coming before the courts and suspected of having mental disability are remanded to the psychiatric hospital for observation, on the basis of which disposal is determined. The activities of the hospital are closely affiliated with those of other hospitals, with the psychiatric service in the public school system, with the juvenile court, and with the local and national committees in mental hygiene and the various social service organisations in the city, in linking together public health activities in the field of mental hygiene. There is accommodation for 30 male and 30 female in-patients, there being on each ward 20 beds in open wards and 10 single rooms.

Both in the out-patient department and in the wards opportunity is provided for instruction in psychiatry for students in the later years in medicine.

Riverdale Isolation Hospital has 375 beds where the study of the diagnosis and treatment of acute infectious diseases can be carried on. It is under the authority of the Local Board of Health, and the direct supervision of the medical officer of health of the city.

SOME REFLECTIONS.

As was indicated in the preliminary statement, the general pattern of medical education in the United States and Canada bears a strong resemblance to that prevailing in this country, where, however, closer homogeneity results from the existence of one body, the General Council of Medical Education and Registration, which has controlling powers. The details given in the sections dealing with the 14 medical centres which were visited show sufficiently that everywhere in the United States the attempt is made to provide for the medical student an education which should alike be scientific and of public utility, but variations of method, while preserving this common ideal, may be noted in this or that centre as they are reflected in the particular statements.

The Duration of Training.

Nowhere will the medical curriculum be found to be of less duration than that which is prescribed by our own General Medical Council, and for the most part the training is actually longer. In those cases where the medical course proper only lasts four years, as against the British term of five years, it will be seen that the pre-medical education, necessary to gain admission to any school, demands a knowledge of the fundamental sciences—that is, chemistry, physics, and biology—and that in only one case is the course, as far as these pre-medical subjects are concerned, of less than two years' duration. So far as this pre-medical course is concerned with scientific subjects it may be taken to represent the first year of the British medical curriculum, so that the addition of the four years' medical training in applied science and clinical work brings the whole professional curriculum to at least five years. No curriculum of less duration than this would be sanctioned at any of the medical centres which aspire to be considered of first-class standing, such as those that were inspected.

The Standardisation of Medical Schools.

And it may be pointed out that for many years a process of purging has gone on in the United States under which the inferior medical schools have been eliminated in a thorough way. As recently as 1906 there were 162 medical schools in the United States, and the training received by the students at some of these places was of a sort to bring all medical education into ridicule. The doctors in the United States suffered at home by having within their medical body members whose scientific and clinical attainments were very poor; and they suffered abroad by finding that claims to recognition by their own citizens in foreign countries were not admitted. This state of affairs, which in certain places had become a scandal, is now largely remedied, and to-day but 80 medical schools exist, and these have been submitted to a scheme of category under which only 72 are placed in the first class.

A system of education now prevails in the representative centres which is generally of a high standard and is carried on over a period which should certainly be long enough to enable the student, when graduation is reached, to serve his calling in accordance with public claims and assist in its scientific development. But it will be noted how great a stress is laid in the medical schools of the United States upon the amount of time that the student spends upon the various subjects of study, a stress that is entailed by the absence of a general system of examinations as we

understand examinations in this country. Where, as with us, the students of all the medical schools are assembled at regulated intervals to meet the common tests imposed by their universities or their corporations, the result of their training is all that they are asked to display, the question of how they were trained playing no part in the tests. The examinations have been standardised by a central authority, and periodical inspections by that authority are held in order to ensure that the standards are lived up to. Our Royal Colleges, whose diplomas, in one division of the country or another, are held by the great majority of our doctors, examine students coming from every medical school, ensuring that from the mass of the student material qualified men are drawn who can show a common and good level of accomplishment. This level, moreover, is not threatened by the multiplication of university medical Faculties which has been a recent feature in medical education, for, first, the university students receive their training at schools that are also training men and women who are not connected with a university, and, secondly, the university students in most cases acquire the College diplomas. To-day with us a doctor is a doctor and, save where the possession of an honours qualification is needed for the holding of an appointment, the particular affixes to a name in the Register have no significance.

The Rôle of External Examinations.

In the United States and Canada the rapid but unequal rises in culture, which are inevitable in the expansion of young countries, make any such centralisation impossible for the present, with the consequence that the medical students from one centre are not associated with those from another centre by meeting any common tests of knowledge, whereat they would display the results of the training received at their various centres to external examiners. Consequently the responsibility of deciding what man or woman is or is not fitted to become a member of the general body of practitioners, for the good alike of the public and of our calling, is placed upon the educational authorities of the individual school; and these authorities, in their character of internal examiners, bring to their assistance a close inspection of the conditions under which the work of the students is done, while regarding the examinational outcome of its doing. Hence the student is asked to occupy his time in certain ways, and this in such detail as to make it believed sometimes that the hours spent over a course can be correlated with the successful acquisition of knowledge. The authorities of the schools are well aware that such correlation can never be an accurate one; but insistence in the educational schedules upon proofs that a fixed time has been spent by the student in this or that direction helps to take the place of a system of external examiners, which cannot as yet be devised as a practical policy.

The Common Pattern Displayed.

At the 14 first-class centres visited the training proceeds in the usual three stages—i.e., it is concerned with: 1. Purely scientific subjects (in the United States and Canada taken in the act of matriculation). 2. Scientific subjects directly applicable to medicine—namely, anatomy, physiology, and biochemistry. 3. Pathology, or the variations from those normal standards with which work of the second period has familiarised the student, as they become related to clinical procedures at the close of the curriculum. The way in which these three stages are divided from one another at all the schools is that with which we are familiar in this country, but we find more attention is paid in the Western curriculum than in ours to the need for continuity. The order in which the subjects are presented to the American medical student varies from that at our schools mainly in the wish to preserve a sequence, the student being introduced to pathological and clinical work when he would not be considered with us sufficiently informed to benefit by such studies, or receiving lessons in psychology while learning histology. Every educational course has to consider numbers and not individuals, and it may be that precocious information fits the mind of one student while bewildering that of another. Hence criticism of any scheme, that at one place it is too fast or that at another place it is too slow, or too much planned in water-tight compartments, is not safe. We have here a real problem for the educationalist, but unluckily his opinions should be based upon evidence which he can seldom obtain, for he should be able to compare the success in after-life of large groups of students, starting their work at the same time, but pursuing it at different schools. In the United States such a big personnel appears to surround some of the principal teaching centres that an inquiry into the matter might well be started.

The Student Material.

The schedules set out in the preceding pages suggest on the face of them that the medical students of America and Canada form a more highly selected material than our medical schools obtain, for almost invariably it is remarked that the number of applications to enter any medical school exceeds by 5, 10, and even 12 times the number of those for whom admission can be found. The figures cannot be taken at their superficial value, if only because the rejected at one centre become the accepted at another. The reports that great numbers of students are being turned away from medical schools, while true in a sense, greatly exaggerate the situation, as can be seen from an investigation made two years ago by Dr. B. D. Myers,[1] whose figures showed that sifting processes resulted in the admission of the better element and the rejection only of a proportion of students less well qualified, so that the regulations for admission to the profession are not the deterrents that they have been thought to be.

The rejection of applicants for admission is carried out by strict scrutiny at all the 14 centres visited, and this procedure is entailed upon the authorities by the fact that the training of the accepted students will lie entirely with them; they will teach them, will promote them or suspend them, and will adjudicate upon their fitness for graduation without appeal to any but individual instructors. The sense of responsibility, thus implied, is displayed at the beginning by ascertaining all that is possible about the student. At the different schools different demands for information are made, but in addition to the production of credentials in proof of the quality of pre-medical education, all the schools expect some personal knowledge of the character and general make-up of the applicant, and at some a personal interview with the dean is required. The close relations thus opened up between the dean and the student are imitated in later phases of the curriculum by the association that occurs between the student and his teachers. Not only, considering the size of the institutions and the number of beds in the hospitals, is the total number of entrants to these schools each year light in proportion to the material opportunities for medical

[1] Myers, B. D.: Bulletin A.Am.M.Coll., April, 1927, ii., 97 July, 1928, iii., 193.

education, but this total comes soon to be split into groups so small that every man obtains what amounts to individual instruction, while the value of his work is watched and reported upon with a view to his place in some category of merit whereon his promotion will depend. It follows that in every stage of his career the way that the student does his work, as well as the outcome of that work, is being taken into account, a condition that cannot occur when the issues are being practically determined by external examinations.

The Examinational Test.

The most striking difference between the medical educational course in America and Canada and that in the United Kingdom is the method at which the teaching authorities arrive at their conclusions as to how far the students are benefited by their training, and how far they are fitted for the service of the public as qualified medical men. Absence of anything corresponding to formal examinations of students at regulated times is replaced by a sifting process that is always going on; and, save for the post-graduate procedures to obtain a State or Provincial licence, there are no external examiners.

Many in this country are found saying that the examination system with us is overdone, and the fact that the duration of a curriculum which is five years by statute is over six years in reality supports the largely held opinion, while this is strengthened whenever the results of some particular examination present a strikingly high average of failures among the competitors. The possible over-loading of our curriculum, accompanied by redundancy of examinations, has received the serious attention of the General Medical Council, but the difficulty for the Council of making the path of the student smoother is aggravated by the fact that there is at least as much pressure brought upon the Council to add to as to subtract from the compulsory schedules. As our art and science enlarge their boundaries many persons, in the spirit of true progress, desire that those developments should find representation among the questions of examiners—in the words of a popular sport, they desire to stiffen a course, which already appears too hard, by the lengthening of certain of the holes or by the provision of more obstacles. That difficulty is met both at home and abroad by the institution of post-graduate opportunities; but while post-graduate instruction is an extensive and well-organised affair in the United States, and while in Canada similar tendencies are manifest, in Great Britain the outcome of much talking has not been proportionate.

What things can safely be left to a post-graduate stage is to ask at the end of the educational curriculum the question which already exists at the beginning—namely, where the line should be drawn defining the medical course. Several of the American universities appear to provide an eight years' course, the total being arrived at by adding four years of pre-medical study to four years of medical study, and many of the schools insist also on a year's residential work before graduation. With our own pattern this course of eight or nine years becomes five years by deciding that of the four years of pre-medical work only the equivalent of one year is necessarily allocated to the study of chemistry, physics, and biology. But such simplification cannot be pursued all along the line, and at several of the American universities it would be impossible under their printed regulations; so that we see that the real place where the medical course proper may be said to start, taking all three countries into consideration, is not exactly certain. Turning to the other end of the curriculum we find that at some of the various centres noted there is much stress laid by teachers upon the knowledge displayed by the students along special lines; indeed, to many British teachers there must appear to be the risk here of a too early and easy detachment of the student's intelligence from the general in favour of the particular. Those who hold this view will also feel in respect of the British curriculum that attempts to add compulsory subjects, whose study must be covered theoretically in five years to the satisfaction of examiners, are on the wrong track, and that post-graduate training is required to meet the case.

In all cases in the United States the students are examined, as far as graduation is concerned, by their own teachers at their own centres, and the personal knowledge by the examiners of the kind of individual student they have before them influences the decisions. The sifting of the men in the pre-medical stage does not prevent a large proportion of the students from dropping out before graduation. The facts are recorded in a card-index of the Students' Register kept by the American Medical Association, from which it is learned that about 90 per cent. of all students who failed to graduate dropped out in the first two years of the medical course. "If, for scholarship or other reasons," says the *Journal of the American Medical Association*, "students are not qualified for the practice of medicine they should be notified in the earlier years so their time may not be wasted by vain attempts in the higher classes, only to be dropped after they have come so much closer to graduation. This not only adds extremely to their disappointment, but also prevents them from making a better use of their time in some other line of human activity."

These words form the most substantial argument against a completely external examinational system; such external tests cannot take note of much that counts, and time is wasted in vain effort. The fact that we possess here in the General Medical Council a single controlling authority functioning under the Privy Council to settle the standard and conduct of examinations makes possible our large and almost complete system of external examination, though there are signs that the internal examiner is gaining in influence with us. The institution of such a body in the United States is quite impossible along similar lines for the individual States could not be found surrendering so many privileges which now accrue to them, nor in Canada are the Provinces ready either to form a central body for themselves or to sacrifice their own initiative sufficiently to fall under the ægis of the General Medical Council.

Licences to Practise.

One consequence is that the various States and Provinces institute for themselves separate schemes of examination according to which separate licences are issued for legal practice in particular divisions of the countries, and here it may be said the principle of external examinations at last shows itself. The students will have graduated to the satisfaction of tests applied throughout their curricula by their own teachers, but to obtain the State or Provincial licence they have to satisfy boards of external examiners. These boards are of very different constitution and the form of examination instituted varies with each State or Province, although there is in America a central board of federal character whose examinational tests are accepted at certain of the larger or older States. It is outside the scope of these notes to comment further upon the licensing process in either

of the countries, but mention is made of its existence because examining boards instituted under it are sometimes alluded to as a proof that external examination is not so entirely unknown as one is usually led to believe, and that even a central body exists. In truth these examinations have almost nothing to do with the educational course of the student proper; the fact that they have to be passed has little or no influence upon the training which the student receives, though occasionally the statement is made, in connexion with the subject of hygiene, that in the tests for licences acquaintance with some of the topics which fall naturally under this heading will be expected.

FIG. 22.—UNIVERSITY OF CHICAGO: FIRST UNIT OF HOSPITAL GROUP.

The Hospitals and the Universities.

Next to the absence of a recognised system of external examinations at regular periods the most striking difference between the educational courses in America and Canada and the conduct of undergraduate training in the United Kingdom is produced by the fact that the schools where the students are trained are integral parts of some university system. Accordingly many of the hospitals at which the clinical work is done are not in their general constitution analogous to the great medical charities whereat our medical students are educated. In the excellent presentation of hospital data made by the Council on Medical Education and Hospitals of the American Medical Association the hospital service in the United States is divided in accordance with the standing of the institutions, or as the hospitals are centres for general education, or for the training of residents in connexion with a fifth year of the medical course, or according to whether the type of service rendered is general, special, and so on; further, the service is also classified according to "ownership or control." Under this heading hospitals may be subdivided as Government owned, as having certain educational functions, as publicly provided, as independently organised, or as belonging to religious denominations, fraternities, or industrial corporations. Certain States have built large hospitals, generally in connexion with a State University, to serve the double purpose of caring for the sick and injured throughout the State and to afford teaching material for the medical Faculty of the State University.

Examples will be found in the notes upon the different hospitals in the United States and Canada where the students receive their clinical training, of institutions which belong sometimes entirely to a university, sometimes entirely to a municipality, and occasionally entirely to a State. Now in so far as proprietorship brings with it privileges as well as responsibilities, it is clear that the appointment of the medical staffs of these institutions must be made on varying principles in accordance with the constitution of the institutions. This is a matter which has to be kept before our minds when the question arises as to the inter-connexion between a teaching hospital and

a university Faculty; it is a vital matter when we are considering medicine as a fit province for purely academic training in the manner that, for example, it is being considered at the University of Chicago (Fig. 22, and p. xxv). These large issues are not, of course, under discussion, but it is pertinent to point out that neither in the United States nor in Canada any longer can a first-class medical education be obtained save through a university school, even though that university may be incomplete in its number of Faculties.

A simple way of looking at this situation is to recall the historic connexion in our own country between the hospital and the medical school and then to look at the will of Johns Hopkins (see p. xxi). With us the medical school arose as a part of the hospital as far as the clinical departments of medical education are concerned; and when the schools arrived little but clinical facilities were contemplated. Thus, and quite literally, the hospital owned the school, and the authorities of the hospital made the appointments to the staff of the school as they did to the staff of the hospital. And these things remain so to-day in the main, though, as is well known, the introduction of the university element has now been effected. With us connexion with a university is no part of the original constitution of the hospital, while the students from universities who use the hospital medical schools do so upon terms—i.e., they pay for the training which they obtain at these large charities because the university, under whose provisions they intend to graduate, requires from its alumni knowledge in certain provinces where only a hospital can afford it. The principle laid down by Johns Hopkins envisages an entirely opposite position. The university enters as a senior partner, owns the hospital, and admits to the wards its own hospital students of its own school. A striking difference at once occurs in the staffing of the hospitals, for while with us the university teachers are not necessarily members of the staffs of the hospitals, in America and in Canada, speaking generally, the hospitals are staffed by the university professors. No difficulty whatever can arise about this when the university owns the hospital, while where the State owns the hospital the views of the State and the university are easily made to coincide as to the elections to the staffs. Where universities use the wards of great municipal institutions the situation is not always so simple, but at the huge hospitals visited at the 14 medical centres in the United States and Canada working arrangements had been made upon harmonious plans.

In Conclusion.

In conclusion, there is made no attempt to formulate conclusions, for a limited and quick survey of large things, involving estimates of academic ideals and of material plant alike, could result in nothing of the sort that would be useful. The wish has been to afford the information necessary to appraise how far the standards of medical education at a group of representative medical schools in the United States and Canada approximate to the standards in Great Britain, and to indicate the main differences so that measures of reform on both sides might be helped by making comparisons.

Many hold that in this country our examinational system is too rigid, while many thinkers in America and Canada regret the absence of some such machinery. With us to regard the hospital as an adjunct to university education is a view that has met with no general acceptance, though the advisability of establishing a close relation between the work of the ward and that of the laboratory is acknowledged; in America and Canada the medical school is an integral part of the university which controls the teaching given in the hospital. Here are two fundamental divergencies worth inquiry upon common grounds.

The story of money on the two sides of the Atlantic is not the same, but no one can say that the one or the other side is wholly at an advantage. The advance of medicine and medical education, in America particularly, is accompanied with a riot of expenditure; dollars seem to flow there as naturally for hospitals and laboratories as gold flowed in mediæval Europe for the great cathedrals; yet all this expenditure in a comparatively new civilisation may not be well directed, and, indeed, may have the danger that accompanies too rapid growth. We have, for our part, too little money but greater experience and greater right to rely upon precedent. Yet for these very reasons we may be too reluctant to adopt measures that would bring about progress.

Nothing but good can come from the endeavour of the great English-speaking peoples to understand each other on such matters On both sides of the Atlantic a simple chant may be heard to the effect that "the more we get together the happier we shall be." In reference to the calling of medicine the jingle is true, and *pourparlers* now taking place through the General Medical Council are concerned with practical measures of a coöperative sort.

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